THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

VOLUME XXI. CLEVELAND, O., OCTOBER 18, 1888. NUMBER 43.

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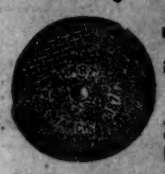

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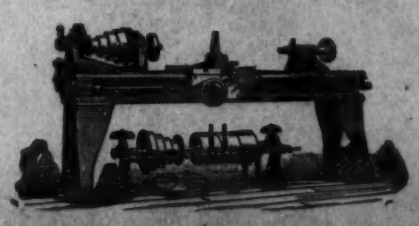

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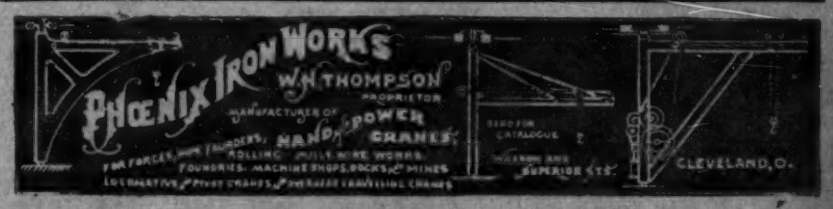

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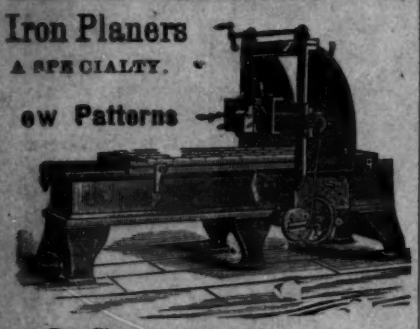

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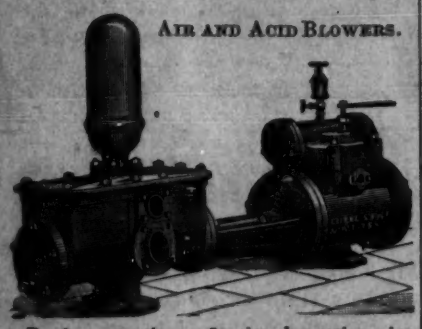

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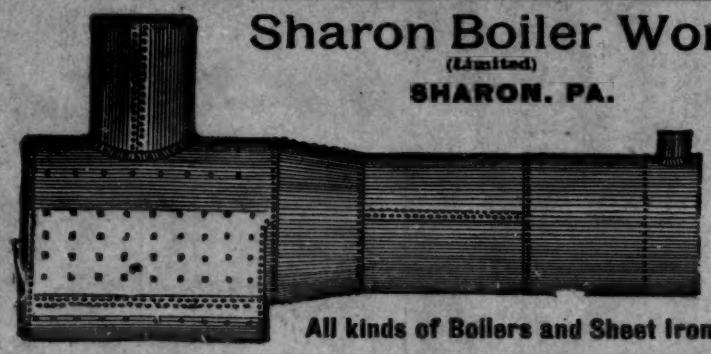

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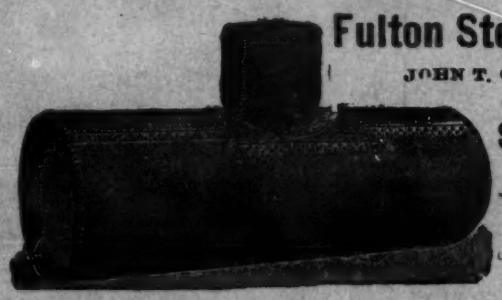

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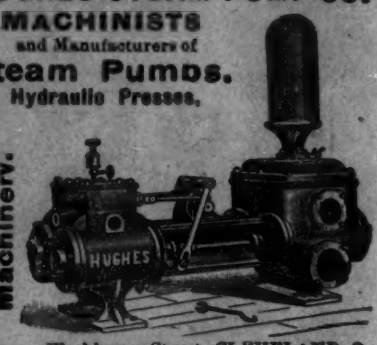

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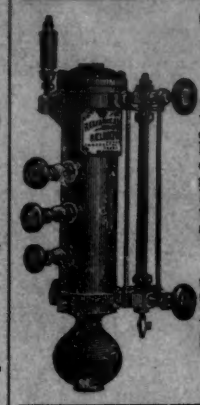

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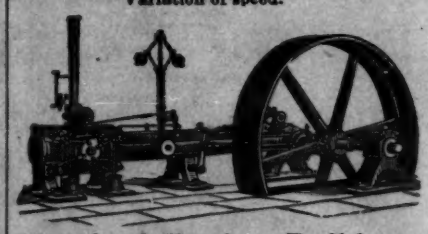

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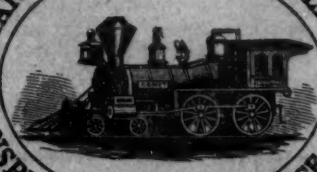

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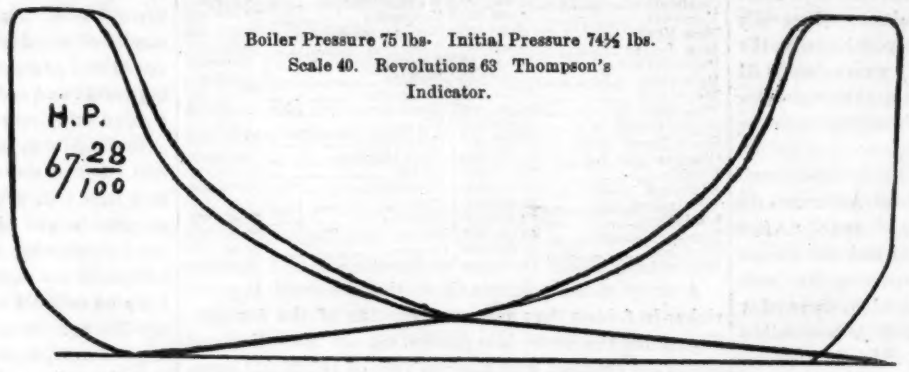
VOLUME XXI. CLEVELAND, O., OCTOBER 18, 1888. NUMBER 43.

REMARKABLE SHOWING OF A CLEVELAND CORLISS ENGINE.

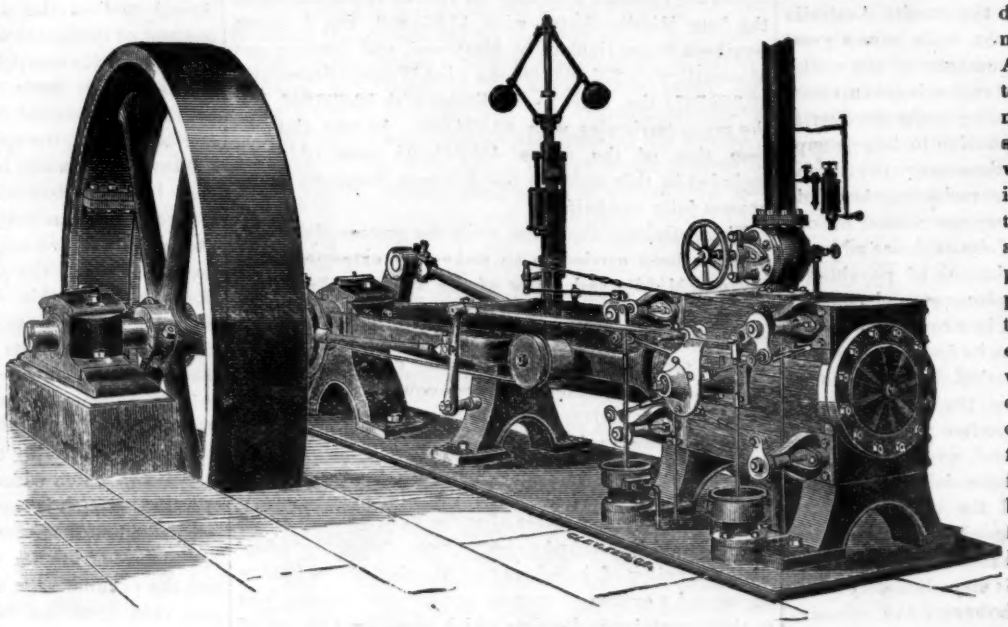
Lord, Bowler & Co., builders of the Cleveland Corliss engine, have just finished a very fine 18″x42″ Corliss engine for Adams & Co., of Chagrin Falls, O., together with their improved boiler feed heater and purifier. They started the plant up last week, and made several very important tests. The results are both gratifying to the builders and purchasers. From tests made on the engine, indicator cards herewith submitted, show that the boiler pressure being 75 lbs. the initial pressure on piston comes within from ½ to 1 lb. of it, or on one card 74½ lbs., the other card 74 lbs., this attributed to the excellent manner of piping the engine up; the in dicated horse-power in first set of cards show 67.28, with a speed of 63 revolutions, the second set of cards show 191 horse-power, with same speed and boiler pressure, or a varying load of nearly 124 horse-power. This shows the engine to be very perfect, and not to be beaten or equaled by any engine of the kind in the country.

The test on their feed water heater showed a temperature of 216° heat. The thermometer used (Forbes) was placed in an inverted elbow, the overflow being caught in a bucket. The purifier attached to the heater received this feed water at 216°, and increases the temperature by means of live steam, and a filter of fine coke, etc., purifies the water; the temperature in this purifier is about same as that of the boilers—about 340° was registered. There is no advantage in this except as a purifier.

There was no fore tests made, but the engineer reported a full saving of one-half the coal formerly used. Messrs. Adams & Co. express themselves highly pleased with the results, and Lord, Bowler & Co. are to be congratulated on having put out such a first-class job, with such excellent results. Thompson's indicator was used.

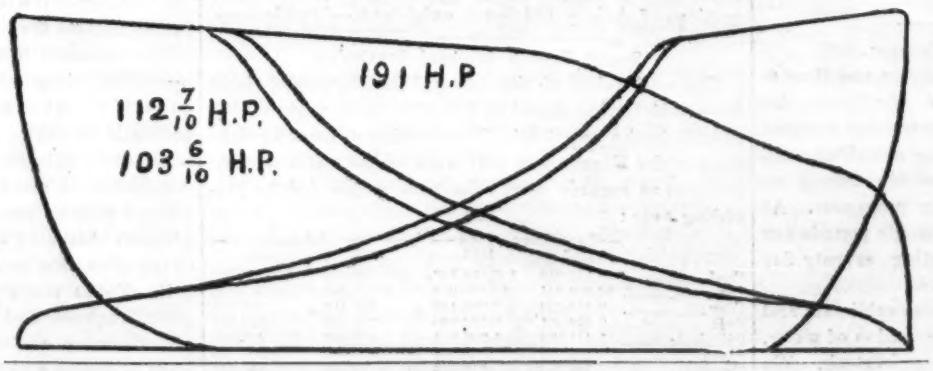


Boiler Pressure 75 lbs. Initial Pressure 74½ lbs.
Scale 40. Revolutions 63 Thompson's Indicator.



CLEVELAND CORLISS ENGINE.

Boiler Pressure 75 lbs. Initial Pressure 74 lbs. Revolutions 63.



Exhaust in paper rolls.

Topical Query No. 66.

Speaking of the coming Scranton meeting of the American Society of Mechanical Engineers, it is expected that a very valuable discussion will be had on the Topical Query No. 66. *What experiences and phenomena can you describe as to the conduct of steels under the conditions in which you were using them?* Considerable discussion took place on this same question at the Nashville meeting in May last, but as the experiences were so varied and difficult to co-relate, it was suggested by a member that at the next meeting such members as have any facts to communicate should do so, that some better theories might be deduced as to the peculiar phenomena observed in the working and use of steels. This is a subject of great interest, and it is urged that every effort be made to make the proposed discussion fruitful of much addition to our knowledge of steel and its properties.—[American Engineer.

All Steel Railway Cars.

It is reported that a company has been organized in Washington with ample capital to manufacture railway cars constructed entirely of sheet steel, under the patents of C. W. M. Smith of San Francisco. The company is said to be negotiating for the purchase of a large tract of land near Chicago, where the cars will be built. It is claimed for the new vehicles that they are absolutely indestructible and non-combustible, and that they can be built as cheaply as wooden coaches.—[Chicago Journal Commerce.

Carnegie, Phipps & Co., have just completed at their Homestead, Pa. works, a casting for the 42-inch cylinder of the 3,000-ton shear in the slabbing mill. It will weigh 54,600 pounds, and will be a reverse casting.

ELECTRICAL TRANSMISSION OF POWER.

Professor Ayrton's paper before the British Association on the "Electrical Transmission of Power," is very enjoyable reading as a popular scientific treatise, and we regret that pressure upon our columns prevents our printing it in full. It is full of a dry sort of wit which crops out where one least expects it. For example: After making the statement that "A person exercises power in the engineer's sense when he exerts himself physically, and the greater the exertion the greater the power," and then he adds, "the exercise of power by the ruling classes, however, is unfortunately not necessarily accompanied by any exertion, either mental or physical." Later on in his address he makes the statement that in America there are 6,000 electric motors working machinery; in Great Britain hardly 100." Although we should somewhat differ from his estimate of the number of electric motors in America, we are not in a position to question his estimate on the number in England, which is a significant index of the rapidity with which new industries grow in two countries. He also makes the statement that "While there are some experiments aiming at possibly increasing the working power of a ton of coal to eight times its present value by earnestly seeking for a method of converting the energy it contains directly into electric energy without the intervention of a wasteful heat engine, it should not be forgotten that in the cheap unburning of oxidized metal may lie another solution." He might have added that it is the dream of some scientists that some day, by the very manufacture of a useful metal which the world will not be able to dispense with, we may obtain the energy with which to manipulate it, and light the factories at night for so doing. —[Light and Heat.

THE farmers of the South are fighting the bagging trust to the last extremity, and they will not use a pound of jute bagging. In almost every instance the farmer's cotton is pledged to the town merchant for supplies which have been pledged to him, and the delay of the farmer to bring in his cotton on account of having nothing to bale it with is causing serious trouble, and may yet result in a panic. The Lane mills, of New Orleans, turn out a cotton wrapper which is said to stand every test that jute bagging stands, and this is being bought faster than it can be turned out. In some instances the merchants are so anxious to get the cotton which the farmers owe them, that they have offered to give them the necessary bagging to bale it, or to sell it at half price, but the farmers say that they will not use a pound of jute bagging under any consideration.

AMERICAN TIN A CERTAINTY.

English capitalists have taken no little interest in the tin mines of the Black Hills in this country. On their behalf Professor M. C. Vincent, F. G. S., has investigated and made a report of the mines in the vicinity of Harney Peak. In a voluminous report, recently published, the professor says: "Harney Peak is the most central and most powerful granitic outburst, but for miles around this mountain, more particularly to the northwest, southwest and southeast, upheaved masses of identically similar rocky materials have taken place, and in all these, without exception, tin oxide (cassiterite) of good quality has been found to occur. These outbursts are of two distinct types or classes. First, of the approximately circular or columnar form, where the granitic mass stands almost vertical like a stack or chimney; secondly, those filling a long, narrow longitudinal rent or fissure.

"I have carefully gone through all the more valuable mineral claims belonging to your company, and must say that your mines—considering the number of them—are on a very favorable and even exceptional footing. Instead of being opened to a great depth, your mines are practically untouched, except in a few instance, and in such cases are only sufficiently developed to more clearly show their real financial value. Generally speaking, the tin ores are of almost typical purity, the eighty-three assays (made by myself) averaging 74.31 per cent. of white metal. There is a remarkable absence of iron, and the ores are equally free from lead, arsenic, zinc and other deleterious elements."

The English trade journals have finally been compelled to admit the importance of these American tin workings. The London *Mining Journal* says: "After reading the professor's elaborate report and the report of the assays of Mr. Claudet, and inspecting the bulk samples of ore (over forty tons) in London, some of it in huge blocks over two tons in weight, it is impossible to doubt the existence of payable tin lodes in Dakota. The tin producers of Cornwall, the Straits, Australia and Tasmania will, without doubt, soon have a great rival in Dakota in supplying the markets of the world. America, that has hitherto been such a large customer for manufactured tin, will, according to the discoveries near Harney Peak, soon be in a position to largely supply her own market, and the time may not be far distant when other important discoveries may be made that will practically close the American market for our manufactured tin. In the face of the evidence adduced it would be idle to deny the existence of payable tin lodes, as also extensive areas of placer ground containing large quantities of stream tin, in a country where it had not been hitherto expected to be found in quantity sufficient to be of commercial value. As to how soon the practical development of these tin discoveries will affect the American market or interfere with the profits of British production will depend, no doubt, on the energy displayed by the companies interested in the development of the mines and the manufacture of plates. That the mines will be speedily developed and that tin will be produced in Dakota before long there can be little doubt, and although it may ultimately affect the British producers, there is, however, one consolation, that the consumption of tin in America is now rapidly increasing and likely to continue to do so."—[Industrial World.

Practical Hints on Disinfection.

The following is from "Disease Germs and How to Combat Them," by Lucius Pitkin, in *The Century* for July, accompanied by a frontispiece portrait of Pasteur.

1st. Corrosive sublimate (mercuric chloride), sulphate of copper, and chloride of lime are among our best disinfectants, the first two being poisonous. At wholesale drug houses in New York single pounds can be obtained, mercuric chloride costing seventy-five cents, and others at ten cents a pound.

2d. A quarter of a pound of corrosive sublimate and a pound of sulphate of copper in one gallon of water, makes a concentrated solution to keep in stock. We refer to it as "solution A."

3d. For ordinary disinfecting solution add half a pint of "solution A" to a gallon of water. This, while costing less than a cent and a half per gallon, is a good strength for general use. Use in about equal quantity in disinfecting choleraic or typhoid fever excreta.

4th. A four per cent. solution of good chloride of lime, or a quarter pint of "solution A" to a gallon of water is used to wash wood work, floors, and wooden furniture, after fumigation and ventilation.

5th. For fumigation with sulphur, three to four pounds should be used to every thousand cubic feet air space. Burn in an old tin basin floating in a tub of water; keep room closed twelve hours, to allow the fumes to penetrate all cracks. Then open a window from the outside and allow the fumes to escape into air.

6th. Soak sheets, etc., in chloride of lime solution, wring out and boil.

7th. Cesspools, etc., should be well covered on top with a mixture of chloride of lime with ten parts of dry sand.

8th. Isolate the patient in an upper room from which curtains, carpets, and stuffed furniture have been removed.

9th. The solution of mercuric chloride must not be placed in metal vessels, since the mercury would plate them.

THE FORESTS OF THE UNITED STATES.

The Philadelphia *Times* summarizes the annual report of the Division of Forestry of the United States Department of Agriculture, which estimates the forest lands in the states and territories as follows:

	Acres.		Acres.
Maine	12,000,000	Minnesota	30,000 000
New Hampshire	3,000,000	Ohio	4,258,767
Massachusetts	1,389,500	Indiana	4,300,606
Rhode Island	163,528	Illinois	3 50',000
Connecticut	650,000	West Virginia	9,000,000
Vermont	1,990,000	Kentucky	12,000,000
New York	8,000,000	Tennessee	16,000,000
New Jersey	2,330,000	Arkansas	28,000,000
Pennsylvania	7,000,000	Iowa	2,300,000
Delaware	300,000	Dakota	3,000,000
Maryland	2,000,000	Nebraska	1,550,000
Virginia	13,000,000	Kansas	3,500,000
North Carolina	18,000,000	Wyoming	7,800,000
South Carolina	13,000 000	Colorado	10,630,000
Georgia	18,000,000	New Mexico	8,000,000
Florida	20,000,000	Idaho	10,234,000
Alabama	17 000,000	Nevada	2,000,000
Mississippi	13,000,000	Utah	4,000,000
Louisiana	13,000,000	Arizona	10,000,000
Texas	40,000,000	Washington Ter.	20,000,000
Michigan	14,000,000	Oregon	20,000,000
Wisconsin	17,000,000	California	20,000,000

A study of these figures shows that the South is much richer in forests than any other portion of the country. Separating the States into groups, the six New England States are credited with a forest area of 19,193,028 acres, the four Middle States with 17,630,000, the fourteen Southern States (including Maryland and leaving out Missouri) with 232,800,000, the nine Western States with 80,358,767, the four Pacific States with 52,630,000, and the seven territories with 63,034,000. It will thus be seen that of the entire 465,645,795 acres of forest included in this estimate the fourteen Southern States possess fully one-half.

These statistics show that while the process of denudation has been carried to an unhealthy extreme in the Eastern, Middle and a few of the Western States, the forest area still remaining in this country is a magnificent one. If the estimates of the department are approximately correct, the timber lands of the country, exclusive of Alaska, cover an area equal to fifteen states the size of Pennsylvania. If proper measures are taken to prevent the rapid and unnecessary destruction of what is left of our forest domain, it should be equal to all requirments for an indefinite period. It is not as yet a case of locking the stable after the horse is stolen and never should be allowed to become so. With the adoption of a policy of judicious tree-planting in the Prairie States and a system of state or government reservations in the mountainous districts which are the sources of the chief rivers of the country, the evil effects which have followed forest demudation in Europe and some portions of Asia would never exist here.—[Bradstreets.

Some British Mineral Statistics.

The total value of the mineral production of Great Britain in 1887 is placed at £55,326,154, as against £55,010,231 in the year 1886. The leading mineral productions of the Kingdom in 1887 were as follows, with comparisons as regards quantities and values for the preceding year:

	Quantities, tons.		Values.	
	1887.	1886.	1887.	1886.
Coal	169,119,812	157,518,482	£39,092,830	£38,145,930
Iron ore	13,608,041	14 110,013	3,235,355	3,513,515
Clay	2,413,693	2,390 440	590,412	583,910
Salt	2,193,951	2,142,990	732,390	1742,178
Oil shale	1,411,378	1,728,503	955,085	435,962
Slate	464,334	456 908	1,118,818	1,107,169
Gypsum	190,783	118,848	48,293	44,462
Lead ore	51,563	53,490	499,137	471,295
Tin ore	14,189	14,232	878,831	780,302
Zinc ore	25,445	23,156	76,182	63,759
Stone	.....	.....	8,609,600	8,917,705

The production of coal, clay, salt, slate, gypsum and zinc increased during 1887, while the output of iron ore, oil shale, lead and tin ores decreased. In values coal, clay, slate, gypsum, tin and zinc ores showed an increase, while iron ore, salt, oil shale, lead ore and stone decreased.—[Bradstreets.

A Lisbon (N. H.) peg mill has shipped 3,600 bushels of pegs to Germany.

THE DIRECT MANUFACTURE OF TUBES FROM STEEL INGOTS.

Fresh attention has just been aroused on this side to the merits of the new departure in tube rolling invention known under the name of the Mannesman Tube Rolling Process, by a communication made at the recent meeting of the British Association at Bath, by Mr. Frederick Siemens, C. E., of London, brother of the late Sir William Siemens. The invention of Messrs. Mannesman found in Mr. Siemens an enthusiastic champion, and he adduced what he regarded as strong reasons for dispelling the incredulity and prejudice that have grown up around the process. Contrary to many of his compeers, Mr. Siemens believes that the process is based on true principles, and that in the Mannesman system manufacturers have to their hand "a method of rolling as new as it is capable of producing effects hitherto not contemplated." Mr. Siemens claims for it that in combining in itself many of the various systems of rolling previously invented, the system may be called the universal system of rolling, in which hitherto all known processes represent a part.

Under the Mannesman system, from a rough ingot of steel, either Bessemer, Siemens or basic, with one or two operations, a perfect seam, and with a circular fibre is produced. Tubes of great length and diameter, and almost of any desired thickness of metal, can be produced at a comparatively low cost, air-tight, and possessing treble or quadruple the resisting power of the best welded tubes of wrought iron.

In describing the new invention, Mr. Siemens remarks that a bar or rod which is passed through the Mannesman rolls will, provided its substance is sufficiently homogeneous and plastic, undergo a violent twisting and stretching action, the fibre being spun as is the fibre with a rope, on account of which the process may appropriately be called a tortional process. The bar in its passage through the mills is twisted in a spinning machine. As, however, it cannot be fed from the outside, as is the thread, and as the diameter cannot be reduced on account of the action of the rolls, it is forced to draw on the interior for a supply of material.

The tube is made as follows: A bar is placed between the conoidal rolls at the part where the diameter being least, the speed at which they move to make the revolution is also least. The rolls seize the bar and draw it into contact with parts of the cones which move more and more rapidly through, owing to the way in which the rolls are set, the space left between them for the passage of the bar decreases slightly. Slight, however, as is this decrease in the space between the rolls, a certain amount of material has to be shifted. The action of the rolls prevents this material from being taken from the outside of the bar, and, consequently, it is drawn from the interior—hence the hollow, hence the tube.

Soon after entering the rolls, a small central fracture is formed, which widens out to a hollow space as the increased stretch is made to take effect on an increased twist acted on from the surface. The increasing twist of the fibre of the bar while passing through the rolls, and the peculiar relation kept up between longitudinal and turning action is the characteristic of the machine.

The mandril is generally used to finish and smooth the interior of the top and to enlarge it, but Mr. Siemens explains that it is an erroneous idea that this mandril is necessary to form the hole in the bar. Such an operation is impossible. No machine could stand the strain if it were to attempt to force the mandril longitudinally through a solid bar of hot steel. Specimens of partially finished tubes were placed before the British Association in proof that the holing within the bar was formed without the intervention of the mandril, Mr. Siemens observing that such specimens quite disposed of the allegation that the hole was made by the mandril. Tubes manufactured upon this process possess great toughness and resisting power, and their qualities, Mr. Siemens contends, upsets the hitherto accepted ideas in shaping metals, inasmuch as it is proved that, instead of avoiding any great twist of the fibres, the imparting to the material of the greatest possible twist with a corresponding stretch by one operation may give to it qualities which it would be otherwise impossible to supply. We are likely to hear more of this process in actual manufacture in the future.—[American Manufacturer.

The grindstone quarries along the shores of the Bay of Fundy are developed when the tide is down. The best material is down low in the bay.

CANADIAN CANALS.

The great lake and river system of Canada has been made continuously navigable for a distance of 2,384 statute miles by a connecting chain of ten canals, comprising 71¾ miles of artificial navigation. This system extends from the Straits of Belle Isle to Thunder Bay, at the head of Lake Superior. The following table of distances indicates also the respective positions in statute miles of these canals thus: Straits of Belle Isle to Father Point, 643; Father Point to Rimouski, 6; Rimouski to Quebec, 177; Quebec to Three Rivers (or tide waters), 71; Three Rivers to Montreal, 86; Lachine canal, 8½; Lachine to Beauharnois, 17½; Beauharnois canal, 17½; Ste. Cecile to Cornwall, 32¾; Cornwall canal, 11½; River and Farran's Point canal, 16½; Rapide Plat canal, 4; River and Point Iroquois canal, 7½; Junction and Galops canals, 4⅝; Prescott to Kingston, 66⅜; Kingston to Port Dalhousie, 170; Port Dalhousie to Port Colborne (Welland canal), 27; Port Colborne to Amherstburg, 232; Amherstburg to Windsor, 18; Windsor to foot of St. Mary's island, 25; foot of St. Mary's island to Sarnia, 33; Sarnia to foot of St. Joseph's island, 270; foot of St. Joseph's Island to Sault Ste. Marie, 47; Sault Ste. Marie canal 1; head of Sault Ste. Marie to Pointe aux Pins,7; Point aux Pins to Duluth, 390. Add to this the 2,234 statute miles, distance from the Straits of Liverpool, and it gives a total navigable length of 4,618 miles from Duluth the extreme head of Lake Superior, to Liverpool. The difference in level to be overcome, to where tidal influence ceases, is about 600 feet. Of this the Canadain canals, with their locks, overcome a height of 532¾ feet. The one mile long Saulte Ste. Marie canal, built by the United States, has one lock, lifting 18 feet. The size of the locks in this system ranges from 200 to 270 feet in length by 45 feet in width. The depth of the water is from 9 to 14 feet, and the government intends to make the whole route fit for vessels of from 12 to 14 feet draught of water. The canal route from Montreal to Ottawa and Kingston has a total length of 246¼ miles, with 59 locks exclusive of the Lachine Canal, and a lockage of 533½ feet. The new works on this route give 9 feet water in locks 45 by 200 feet. Canal navigation is secured between the St. Lawrence and New York by means of the Richelieu river and the Chambly canal. This has 9 locks with 7 feet depth of water; and connected by Lake Champlain with United States Erie canal and the Hudson river; a total distance of 411 miles. Of the Trent river navigation, between Lake Huron and the Bay of Quinte of Lake Ontario, 235 miles, only part has been made navigable, chiefly for the passage of timber, and 155 miles distance is available for light draught vessels. Finally, there is the St. Peter's canal, cut through an isthmus half a mile wide, between St. Peter's bay on the Atlantic, and the Bras d'Or lakes of Cape Breton. It has a lock 48 by 200 feet, with a depth of 18 feet and a breadth of 55 feet. The government of the Dominion has decided upon enlarging the St. Lawrence system and connecting a new canal on Canadian soil at Sault Ste. Marie, which will give an immense impetus to the national carrying trade.—[Toronto Empire.

THE WHEELING STEEL WORKS.

The Wheeling Steel Works, at Benwood, near Wheeling, W. Va., were built in 1886 to supply three of the nail mills of the Wheeling district with slabs for nail manufacture. The general arrangement of the plant was on the lines first developed by Mr. Robert Forsyth, of the Union Steel Company, Chicago, the principal feature of which is the transfer of the casting operations into a special pit. The two converters, which usually blow 12,000 pounds of metal, are placed side by side in front of a pit, commanded by a central crane. The latter has a telescopic arrangement by which it receives the iron car, into which the iron is run from the three 8-foot cupolos, placed along the outside of the pit. In this manner the converters are entirely free from all encumbrances in the form of runners, etc. The same central crane receives the steel ladle, from which, by the same telescopic arrangement, it is pushed along a short track, which connects the converter-pit with the ingot-pit, the latter being commanded by a central crane. The plan at Wheeling provided for a possible addition of two more converters, so that the two now in are placed on one side of the center line of the building.

The iron as it comes from the cupolas carries about 1.4 per cent. of silicon, and the steel produced contains from 0.05 to 0.08 of carbon, and about 0.35 per cent. of manganese, the ferromanganese being preheated. The ingots for slabs run about 4,000 pounds, and those for billets 3,000 pounds, the maximum output per day having been about 4,500 tons, while the weekly average is 2,000 tons of soft steel. The ingots are placed upon trucks, and are switched by a locomotive on the track which puts them within the range of the heating furnace cranes. The reheating is done in two pits, with three holes each for four ingots. The company have been forced to return to the use of producer gas for all purposes, except drying ladles and bottoms. Like the other manufacturing establishments of Wheeling, who were the first to give the two natural gas companies encouragement, they have found themselves promptly sacrificed to the demands of domestic consumers on the first signs of shortage. It has been a matter of frequent occurrence, especially in Winter, to have the supply curtailed, and at times entirely cut off. The Wheeling Steel Company have, therefore, for some time past, given up the use of natural gas except for the purposes named.

The reheated ingots are carried by a buggy to the blooming mill, a 36-inch MacKintosh, Hemphill & Co. mill with tables, driven by a 40x48 inch Southwark reversing engine having a piston speed of 1,200 feet on ordinary work. The billets and slabs are sheared by a shear built by the Morgan Engineering Company, of Alliance, O., which has a capacity of 120 square inches. The shear is located close to the end of the building, the slabs or billets being delivered outside of it upon cars standing on a track. They are pushed under a spray of water and switched back to a point where they are loaded on railroad cars.

Blast is furnished for the works by an E. P. Allis engine having a 36-inch steam and a 48-inch blowing cylinder and a 5-foot stroke. The engine is of special design with fly-wheel and rocker, and is pronounced by John E. Fry, the general manager of the works, a particularly efficient piece of machinery.—[Iron Age.

THE CYCLONE FLUE CLEANER.

This device is manufactured by the Crescent Manufacturing Co., of this city.

The cleaner having a conical shaped head, it adjusts itself to the ends of the tubes and excludes the air, thereby preventing condensation and insuring dry steam.

The Auger shaped steam passage is without obstruction or device from the induction end to the outlet of said passage, whereby the full pressure is obtained.

A current of dry steam is delivered directly against the face of tubes in an unbroken sheet, continuing through their entire length, in a cyclonic or whirling motion, with a sweeping force, thoroughly removing all soot, ashes and other foreign substances, and when used daily, absolutely prevents the formation of scale in the tubes, besides greatly improving the draft.

The head is cast in one piece, and attachments, consisting of T coupling and hose clamps, are malleable iron. The handle is of hard wood. There are no screws or loose parts to become lost or out of repair. The entire cleaner is well proportioned and finished, and will last as long as the boiler.

The cleaner requires no oiling or adjusting, and is ready for use at all times by turning on the steam.

The entire operation of cleaning a boiler requiring but from three to five minutes.

Owing to the ease and rapidity with which this cleaner operates, the duties of the fireman are materially lessened, and the work of cleaning made agreeable rather than arduous. For this reason the tubes are more frequently cleaned, thereby effecting a saving in fuel equivalent to the first cost of cleaner every 30 days, besides admitting of a poorer grade of fuel being used. The device is a taking one, and a very large trade is being done in it.

THE absolute mean deviation of the new magazine rifle for the army is only a little over a foot at 1,000 yards. Using a fixed sight a man can be struck up to 470 yards, as the trajectory is remarkably flat. The authorities do not at present propose to make use of a smokeless powder, as the keeping properties of these compounds in warm and damp climates has not as ye been tested. Lobel rifles are being manufactured for he French army at the rate of 1,600 a day.—[Ex.

THE ECONOMY OF CRUDE OIL FUEL.

A paper mill burning 43 tons of coal a day under eight boilers of 85 horse-power each, can save $21 a day by substituting crude oil for coal, according to the *Stationary Engineer*. The amount of oil consumed under eight boilers, each one of 85 horse-power, is 130 barrels per day of 24 hours. Reckoning three barrels being equal to a ton of coal, we find it would take 43 tons to do the same work. Now, 130 barrels of the fluid would cost at 50 cents per barrel, $65, and 43 tons of coal at $2 would cost $86. One man is all that is required to watch these eight burners, and then part of the time he can quietly repose in a big cushion chair. Before using oil it required four men every 24 hours to shovel the coal to the firemen, and a like number to shovel it to the fire boxes. Here is a saving of six men, and just that much more profit will go down into the proprietor's pocket. The oil burns very steady and makes a uniform heat, keeping the boiler at one degree of heat at all times, not injuring the boiler in the least.

The apparatus is thus described: First, a large tank capable of holding 700 or 800 barrels of the fluid is situated probably 500 or 600 feet from the boiler room. Then in the boiler room an oil pump brings the oil to one of 250 barrels capacity 100 feet from the furnaces that are situated out in the yard. From this small tank, which is placed on an elevation above the furnaces, the oil runs through two 2-inch pipes to eight burners, as only eight boilers are in use at the time. The burner is is a casting 2½ inches in diameter and 1 inch long. This casting is in one piece, with two sections: the upper section is where the steam passes through the burner and the lower for oil. They have no connection with each other until their ends come together, where both steam and oil come in contact with each other, and the steam sprays the oil to all parts of the fire chamber. The pipes through which steam and oil enter the burner are 1 inch in diameter, and plenty large enough to supply the demand. These pipes are supplied with pipes to regulate the flow of either the steam or oil, as the engineer desires. The grates are covered with a layer of brick, only leaving an opening for draft the size of one brick. Back through the arch at zigzag distances piles of brick are placed, somewhat resembling a bridge wall, or more like the liltle block house the little child builds. These bridge walls are to be utilized as heat retainers, with the openings so as not to impair the draft of the furnace in any way, and they do the work intended, for they are at a white heat at least 10 feet from the burners.

Here is another point where the fuel has an advantage over coal. How would piles of brick, serving as heat retainers, do in an arch that had a poor draft and fired by coal with all its smoke and gases, that need a strong draft to burn? Now go to the rear end of the boilers, and looking forward through the arches, we see nothing but red-hot brick and a livid heat throughout the furnace. Here we see the flaming oil burning the very steam that forces it into the furnace or combustion chamber, and the intense flame staring you in the face. We close the door and go out into the yard to look for a cloud of smoke arising from the stack and are disappointed. But from the fuel under these eight boilers we find about as much smoke as would come from a common wood stove.—[U. S. Paper Maker.

Mining in Northern Ontario.

Chicago Journal of Commerce.

The Mining Commission appointed by the Government of Ontario has been through the region lying along the north shore of Georgian Bay from Sault Ste. Marie to Sudbury, and also visited the Silver Mountain and Whitefish Lake silver district, also the Lake-of-the Woods region, the Rainy Lake region, and the region south of Lac des Milles Lacs, where, according to Mr. Charlton, the chairman, extensive deposits of iron and rich gold indications are found. Further investigation will be made respecting the iron and phosphate deposits in Eastern Ontario. The salt district of Goderich and Kincardine, the petroleum region of Lambton County, and the gypsum deposits in the Grand River Valley will also be visited, and the work of investigation will probably be completed towards the end of October.

IN the Coleford district of the Forest (Dean, Eng.) a small colliery has recently been opened, and while a collier was engaged in breaking up a fall of block coal, he found a toad in the center. It seemed firmly imbedded in the coal, and it was alive. Its form was imprinted upon the face of the mineral, and the animal is still living.

THE
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IS THERE SUCH A THING AS BUYING TOO CHEAPLY?

The frightful condition of certain of the working people of London, especially those engaged in the mak. ing of clothing by what has been called "the sweating system," was brought to the attention of the English Parliament, and both Houses appointed Committees of investigation. We propose to use an extract from the report of the Committee to the House of Lords. The italics are our own, to emphasize certain sentences :

"'The existence of grave evils,' is very amply proved within the limits to which the committee were compelled to restrict themselves, by the terms of the reference to them, and they now ask for an extension of their powers that they may pursue their investigations in other trades and in other parts of the country, to the end that a full and complete discovery may be made of all the facts. We hope, and we cannot doubt but that this prayer will be granted, that every ramification of an evil so widespread and so pernicious will be thoroughly probed. As to what the remedy should be when all the facts shall be known, it is not easy to say, but civilzation has not much to boast of if one cannot be found. The extreme keenness of competition and the craze to buy cheaply are, in our judgment, largely responsible as first causes for the mischief. Few realize, probably, that in forcing down the prices of goods they are directly promoting the worst evils of the sweating system, and where responsibility is thus divided it is, we fear, idle to hope for any very immediate improvement. *This universal demand for cheapness drives the maker to make a better bargain with the middleman, who, in turn, squeezes the last hour of labor, the last drop of blood, the last trembling effort of the muscles from those who work for him.* This unthinking demand for cheapness it is that opens the doors to foreign workmen, who crowd into the places left vacant by British labor, when toil becomes scarcely more than slavery. Government can do something to improve the sweating dens by insisting upon light, air, and cleanliness in the workshop : but Government can do little to alter the irrevocable laws of supply and demand, which must continue to place at a disadvantage the unhappy creatures whose condition has been the subject of this inquiry. We do, however, believe it is still possible to make an impression upon the consciences and sympathies of the general public. It is no sentimental plea that we are urging, for we are convinced that it will be hopeless to effect any permament reform without a sensible diminution in the almost universal craving for buying cheaply."

The principal stock in trade of the Revenue Reformers and Free Traders, is that the workmen and the farmers of this country are taxed to death for the benefit of the "Robber Barons," and that under their benign rule, they would be enabled to buy what they needed much cheaper than they now can. It so happens that the Hon. Mills, in his House speech, made a special point on the subject of the clothing of the workingman, getting off the tiresome drivel of the workman wanting a new suit, and having to work twice as many days as a foreign workman to get it. Hon. McKinley very readily showed that all ordinary woolen clothing was almost as cheap in this country as abroad.

It is an unfortunate fact that the sewing men and women are the most poorly paid of any of our operatives, owing to excessive supply of labor, but their condition is a happy one, compared to the hapless lot of objects of the above reports. The statements published from time to time in the English papers, and reports, are enough to draw tears of blood from stones. The middlemen, grasping, rapacious and cruel, make their profits by squeezing "the last hour of labor, the last drop of blood, the last trembling effort of the muscles, from those who work for him." These heaven and man-forsaken men, women and children of toil, whose lives are without one shred of comfort, or one ray of hope, the Revenue Reformer proposes as competitors for the workingmen and women of America. Call it sentimental if you will, but the Protection policy of this country is a gospel of humanity. It does not believe in buying as cheaply as you can, when in doing so you involve any class of people in penury and misery, hopeless and profound, but in buying under such conditions as will result in the largest good to all concerned. The American workmen generally, have struggled for and maintained for years their rights to a proper remuneration for their labor. Assuming what is not true, that everything in America is higher than abroad, they are willing to pay more, because they earn relatively much more than they pay, and they believe in the doctrine, "Live and Let Live." No intelligent workman believes in buying as cheaply as he can, when that buying will make a nation of paupers.

E. C. P.

THE BASIC PROCESS.

In our last issue in speaking of the decision against Mr. Reese, in the Courts, we said that the basic process is unavailable in this country, until the expiration of the patents, unless the Bessemer pool would grant licenses.

We are glad to learn from the *Iron & Steel Bulletin* that the owners have been and are ready to gran licenses to any and all upon a royalty of $1 per ton of metal converted into steel by the basic process. This ought to stimulate greatly the development of those sections in the South having high phosphorus ores. It ought especially to give a new lease of life to the Roane Iron Company, of Chattanooga. They have the mill-converter plant and furnaces, and within a short distance of them, brown ores in abundance, admirably adapted to the making of basic steel, being high in phosphorus and low in silica. The past history of this company presents some curious phases. Well located for the manufacture of iron rails, the substitution of Bessemer steel placed them at a great disadvantage. They were a long distance from Bessemer ores, and could only run when the price for finished steel was high, and as for several years past the tendency has been towards lower prices, they have been practically out of the market. The adoption by them of the Basic Process ought to change all this. The necessary changes in the present plant could be readily made in a short time. It does seem a pity that with the large demand from Southern enterprise for steel, that it cannot, at least, be partially met by home industries.

Now that all litigation is at an end, a good title can be given.

WE call the special attention of our readers to an article, published elsewhere, under the title of "The Direct Manufacture of Tubes from Steel Ingots," taken from the always invaluable English Letter, in the last issue of the *American Manufacturer*. The invention is a radical one, and, if sucessful, will effect a revolution in the particular branch of trade affected.

WHY IS IT DIFFICULT TO MAKE GOOD FOUNDRY IRON FROM A BURDEN OF ALL MAGNETITES?

The last number of the *Journal of the Charcoal Iron Workers*, has instituted a plan which must prove of large interest to iron workers. It has made of noted iron masters certain inquiries as to the working of certain materials. We publish below an article in answer to the question in our heading, by Mr. Edgar S. Cook, of Pottstown, Pa. For a number of years Mr. Cook has been manager of the Warwick Iron Company, and has not only obtained results with his furnace that have placed him in the front rank as an iron master, but he has contributed in a most valuable manner to the metallurgical literature of the day. We follow the article with certain editorial comments, which may be of interest to the trade.

Good "foundry iron" may be considered a comparative term, for a brand unexcelled for some purposes may be most worthless for others, and *vice versa*. Within recent years these distinctions are being made with some intelligence and judgment, but there is still room for improvement. Used in a general sense, good foundry iron may be considered soft, open grained pig irons, best adapted to the greatest variety of foundry work, and capable of carrying a large percentage of scrap. For special purposes, equally as good foundry iron can be made from all magnetites as from any other mixture of ores, but as a rule irons made from magnetic ores exclusively will not rank as high as those made from mixtures consisting largely of brown or red hematites.

The difficulty of producing a large percentage of foundry iron with magnetic ores was more marked with the small anthracite furnaces of former years than with the larger and better equipped plants of more modern construction. The use of a portion of coke has made the management also somewhat easier, and consequently enabled the percentage of foundry iron produced to be increased.

The difficulties attending the production of a large percentage of foundry iron from all magnetic ores are due to several causes. Mention will only be made of the leading ones. Within certain limits, the greater the ease with which the iron of an ore parts with its oxygen, the more regularly and rapidly will the furnace perform its work of reduction and melting, and the hotter will be the crucible with the same weight of fuel. That the reduction or magnetic ores proceeds more slowly than of brown hematites or red oxides is probably due as much to their mechanical structure as to any difference in chemical composition. Most of magnetic ores available in the Schuylkill and Lehigh Valley districts of Pennsylvania are dense, close, compact ores. These ores, even when entirely free of sulphur, are more or less difficult to work, especially when filled into furnace in large pieces or masses, too heavy for one man to conveniently lift into a charging barrow. The writer has seen the dense New Jersey magnetics so filled into furnaces and at the same time the managers were complaining of the impossibility of making foundry grades, and the tendency of the furnace to work irregularly, or to run off on white iron, without (to them) any apparent cause.

The furnace gases experience more or less difficulty in penetrating, breaking up and de-oxidizing dense ores; they can be broken down more cheaply with hammers. Open, porous ores, or ores containing considerable combined water, are quickly and thoroughly permeated. In consequence, with magnetites there is a greater consumption of heat in the lower parts of the furnace, and, from the presence of ore only partially reduced, there is apt to be sudden variations in the temperature of the crucible. One of the conditions requisite to the production of a large proportion of the higher grades of foundry iron is almost absolute uniformity of temperature of the lower parts of the furnace. The crucible and boshes seem to acquire certain shapes or proportions by graphitic accumulations, without which uniform grades of No. 1 and No. 2 x iron can scarcely be made. Time is required to form these accumulations of graphite, etc., but they are quickly and easily disturbed, and the disturbing cause seriously affecting the product of foundry iron. The use of magnetic ores exclusively renders these disturbances more frequent and less subject to control, owing to the difficulty of thoroughly de-oxidizing them before reaching the crucible. With magnetites forming the burden, the rapidity of travel of the stock in the furnace needs to be very carefully watched, and the composition of the slag kept as uniform as possible. Any considerable

variation in slag, or too rapid or too slow driving (variations that would pass unnoticed with easily reducible ores) are reasonably sure to produce marked changes in the furnace running on dense magnetites.

The objections to structure do not hold good so far as the soft earthly magnetic ores are concerned. These ores, on the other hand, usually carry considerable sulphur, an element which is well known as an unrelenting enemy of foundry irons. When present in the dense class of magnetic ores, it entirely unfits them for the economical production of foundry iron. When thoroughly washed, however, these form fairly good mixtures, as the washing not only removes the sulphur, but also opens the structure of the ores, rendering them porous and easily attacked by the blast furnace gases. Brown hematites and red oxides rarely carry sulphur to any considerable extent, which alone is a decided advantage in their favor in competition with magnetic ores.

Soft magnetic ores, free from sulphur, are fairly well adapted for making foundry grades; with these forming a large part of the burden, no particular difficulty is experienced in making open-grained iron; this would indicate that the difference in chemical constitution between the magnesia and the red oxides is not responsible for the greater difficulty experienced in reducing magnetites.

The grain or fracture of foundry iron by which it is graded does not always indicate how it will work after remelting. The writer has seen large, dark grained and evenly crystallized iron condemned because it ran hard in small, thin castings. The fracture of the iron was all that could be desired, and it also had the soft appearance that is familiar to the expert, but difficult to describe. This iron proved hard in small castings, owing to the low percentage of silicon it contained (from 0.6 to 0.8 per cent.), and even when melted, without the addition of any scrap, would form a slight chill or hard shell on the surface of a casting in immediate contact with the mold. Experiments in the pig beds showed that this metal gave from $\frac{1}{16}$-inch to $\frac{1}{8}$-inch chill as tested in Whitney chill cups.

Foundry irons made exclusively of magnetic ores, whether they be close and dense of structure, or of the soft, earthy varieties, are apt to show this tendency more or less; it is this want of uniformity that renders them undesirable for general foundry work, except as mixtures to strengthen the softer of weaker irons. While low silicon in the pig iron is undesirable for foundry grades, yet for mill irons this quality becomes valuable. Hence for the best brands of either grade, the average consumer of foundry iron will consult his interest in purchasing his standard iron from furnaces making a specialty of this branch of the business, while the mill manager will avoid the forge grades made by the foundry furnaces and seek his supply of best iron from those blast furnaces making a specialty of mill or gray forge pig iron.

As a rule, the gangue of magnetic ores contains but little free quartz or sand, the silicon is usually in combination with alumina, lime or magnesia, and the slag to this extent is partially made, so that the limestone flux added to the ore charge to produce slag of certain composition combines with the gangue of the ore more readily and at lower temperatures than when the gangue is chiefly quartz and sand. In consequence, the iron made is less liable to contain reduced silica.

Other causes affect the percentage of silicon in the pig—but they pertain more to the management of the furnace itself than to the ores smelted. Large furnaces and superheated blast permit of the production of high silicon foundry iron without particularly affecting the economy of the work. The low silicon foundry irons made from magnetic ores give varying results in the foundry, depending upon the knowledge of foremen of the melting departments; these irons, when also low in phosphorus, require more fuel to melt them, and to run them as fluid as irons rich in silicon and phosphorus, but the difference in cost of fuel per pound of iron melted is but trifling. While this fact is known to many founders, others conduct their cupolas without regarding the different requirements of irons of various compositions, and, as a result, many imperfect castings are charged to the iron used when the fault really lies in the management of the cupola.

The grading of foundry iron is troublesome and annoying, as conditions altogether independent of chemical composition change the grain or fracture by which the pig iron is graded, bought or sold. Attention has lately been called to this subject, and I have only to add that frequent mistakes are made at the furnace by breaking and grading pig iron when too warm. Sample pigs are usually taken from about the middle of each bed of the cast. The pigs should be cold—the temperature of the atmosphere. If only moderately warm the grain will show larger, darker and even more crystallization than when broken entirely cold. If a pig is broken warm and then broken again after losing all its heat, the first fracture may show No. 1 grade, while the second, even within a few inches of the first, will be only No. 2, or silver gray. All irons do not alter to the same extent; possibly the higher the silicon and phosphorus the more difference there is in the appearance of the fractures of the same pig broken warm and then cold.

NOTES.

We take from the above the following sentence: "That the reduction of magnetic ores proceeds more slowly than that of brown hematites or red oxides, is probably due as much to their mechanical as to any difference in chemical composition."

The presence of proto-oxide of iron in a magnetic ore, has unquestionably something to do in making this ore more difficult in reduction than a peroxide, but Mr. Cook is undoubtedly right in attributing the chief difficulty to the mechanical condition of the ore. Bell has very clearly shown the difference in the time of reduction owing to this cause.

He passed a current of carbonic oxide over four classes of ores, first using a slow and then a fast current.

At a temperature of 410 C, the original oxygen was removed in a given time, with a slow current, as follows:

Kind of ore.	Per cent. of iron.	Original oxygen removed.
Calcined Cleveland	40.0	37.3
" Spathose	51.7	15.4
Lancashire hematite	66.6	35.9
Elba specular	66.8	16.8

with a fast current respectively, 50.6 per cent., 41.9, 70.9 and 18.1.

These experiments seem to show conclusively the enormous retardation in the de-oxygenation of an ore with a dense physical structure, and that when working these ores, preliminary work must be done to overcome this drawback in the furnace. Could these ores be thoroughly roasted, they would be helped immensely, but this in the majority of cases is not an available remedy. Hence the only thing that can be done is to crush ores of this character, as small as is possible, and to keep them long in contact with the reducing gases in the upper part of the furnace.

Bell has also shown that the principal reduction ought to be accomplished at a low heat to prevent the adverse action of carbonic acid gas. It would seemingly follow that all magnetic ores, and, indeed, specular ores, can only be smelted to advantage, *i. e.*, small fuel consumption with regular product, in a high furnace. Every furnaceman knows that with the ores properly prepared in the upper part of the furnace, that the uniform temperature of the crucible can be maintained, and a uniform quality of iron produced. Mr. Cook has very clearly pointed out the cause of the trouble, viz.: the magnetite charged in lumps, descends through the furnace unreduced, save on the outsides, and reaches the hearth as a heat disturber, absorbing and wasting there the calorics that should have been simply applied to melting. In the succeeding article of the same *Journal*, by Mr. E. S. Moffat, General Manager of the Lackawanna Iron & Coal Company, he states that he used 50 per cent. of his burden on concentrated Chateaugay ore—that the furnace worked well, and showed no peculiarities. Now this ore was exactly in the condition which permitted the most rapid and regular action of the reducing gases upon it. It is the shape of sand, and each particle begins to feel the influence of the gas upon it as soon as it enters the furnace, and so minute in bulk, the oxygen rapidly disappears. In former days, with furnaces of moderate heighth, and with the use of anthracite coal alone, and that charged into the furnace in enormous blocks, there was a tendency for this ore sand to run, in a raw state, through the great interstices made by the coal, into the lower region of the furnace, causing a vast deal of trouble, and often bringing about disaster.

Unfamiliar with anthracite practice as most of the Western ironmasters are, it would be a piece of general but most desirable information, if Mr. Cook would kindly inform them whether there has been any change in late years, in the size of the anthracite coal charged. To us it would seem that fuel in moderate-sized pieces would produce more regular and better results, than when used in large blocks. Whatever practice may show in this respect, that magnetic ores, of dense structure, should be thoroughly and minutely broken up, before going into the furnace, seems to admit of no doubt.

E. C. P.

Technical Instruction of Capitalists.

In trying to account for the great rapidity with which new ideas and inventions are developed in this country as compared with the slowness abroad, many reasons have been suggested. Principal among these we may cite the oft-quoted conservatism prevalent in European countries, and that timidity which causes a man to shrink from entering upon enterprises of the ultimate success of which he himself is not capable of judging. But while this is undoubtedly so, the true cause may perhaps be looked for in yet another quarter; and it may be as Prof. Forbes pointed out recently, that America's success is due largely to the technical and mechanical education of many of her men of capital. With their training it is evident that they can form a tolerable good judgment of the value or practicability of a new device, and upon this their capital is readily forthcoming. The cause for this lack of technical education among men of capital abroad is quite apparent. It may be set down as a general rule, that, respecting and obeying the prejudices and practices of the past, moneyed men abroad, whether "new rich" or old, shrink from educating their sons in the mechanical arts, which are still a little outside the bounds set by social caste. Consequently a liberal education, as it is called, takes the place of a course in science or the arts. When we consider the general practice among our capitalists of sending their sons to technical and mechanical schools, there need be no fear for a future lack of technical education among those who are to have the disposition of large funds, even though European social restrictions should unfortunately come to enjoy more weight here than they have had hitherto.—[Electrical World.

A New Incandescent Gas Burner.

Mr. James Lewis, of Gloucester-terrace, West Green-road, Tottenham, England, has patented an incandescent burner. This invention relates to incandescing gas burners provided with a high pressure air supply. The air-supply pipe is placed inside the gas-supply pipe, and just above the nozzle of the air pipe there are a number of branch pipes opening into the mixing tube. Consequently, the high pressure air supply sucks in the gas, and also air from the atmosphere—gas and air becoming thoroughly mixed in the mixing tube leading to the burner. The mixing tube opens into the lower end of a chamber, the upper end of which carries the incandescing hood. In the upper end of this chamber (just below the incandescing hood) a perforated block of metal (or a number of small tubes) is inserted, this arrangement not only preventing "firing back," but also assisting in the mixing of the gas and air.

Locomotives Increasing Rainfall.

A correspondent of the *Northwestern Railroader* advances a curious theory for the increasing prevalence of floods and rain storms. He says that there are over 30,000 locomotives in use in North America, and estimates that from them alone over 53,000,000,000 cubic yards of vapor are sent into the atmosphere every week, to be returned in the form of rain, or over 7,000,000,000 cubic yards a day—"quite enough," he says, "to produce a good rainfall" every twenty-four hours. Estimating the number of other non-condensing engines in use as eight times the number of locomotives, the total vapor thus projected into the air every week in this country amounts to over 470,000,000,000 cubic yards. "Is this not," he asks, "sufficient for the floods of terror? Is there any reason to wonder why our storms are so damaging?"

Deafness Caused by the Electric Light.

A curious phenomenon was recently related by M. D'Arsonval before the French Academy of Medicine. After gazing for a few seconds on an arc light of intense brilliancy, he suddenly became deaf, and remained so for nearly an hour and a half. Surprised and somewhat alarmed in the first instance, but reassured by the disappearance of the symptoms, he repeated the experiment with the same result. When only one eye was exposed to the light, no very marked effect was produced.—[Medical Press and Circular.

Two artesian wells recently sunk in Sonoma Valley, Cal., are considered to be worth not less than $10,000 each. One of them flows 90,000 gallons of water per day and the other 100,000.

ENGLISH ENGINEERS ASTERN.

It is a remarkable fact that in the manufacture of different kinds of machinery, the Americans can beat us in price. Wages in the United States are about 50 per cent. higher than in this country; materials are from 25 to 50 cent. dearer; yet the finished machines can be put on the market cheaper. It is true that the Americans cannot send out machines to neutral markets any cheaper than is done by our manufacturers; but it is surprising that they can at least meet us in price. The chief explanation, as we pointed out in a leader in the last impression of the *Iron and Steel Trades Journal*, is the fact that in the United States the inventive faculty is impelled and sharpened by necessity, and has been applied to the designing of labor-saving tools. The stagnation and lack of trained brain-power among our manufacturing engineers is largely traceable, we think, to the fact that the *Engineer* and *Engineering* have poohpoohed the idea that the Americans were ahead of us in any respect. While those journals which profess to be the mouthpieces of the engineers, have scouted the idea that the engineers of this country were second to the American engineers, in any respect the engineers who have visited the United States, have almost unanimously returned with the impression that in setting out manufacturing establishments of the best class in America, the object kept steadily in view is the need of cheap production. Our iron and steel masters supply our engineers with the best and cheapest materials the world produces, and there is no room for doubt that our iron and steel-producing establishments are in every respect in front of the works in the United States. Our engineers forfeit many of the advantages which the iron and steelmasters confer on them in the shape of cheap and good materials by their comparative failure to utilize labor-saving tools. Our engineers should bestir themselves. As we pointed out in a leader last week, the engineers on the North-East Coast have recently given all other districts a lead, and there are many indications which go to confirm the opinion that our engineers generally are exhibiting additional signs of adopting labor-saving tools to a much greater extent than has been the case in a large majority of the machinery-producing workshops. It is matter for surprise that the works, which are devoted to the manufacture of labor-saving machines for all other industries, are the least given to the utilising of new and expeditious tools. So long as our iron and steel master supplied the engineers with materials much cheaper than could be done in other countries, there was not so much necessity for the engineers scheming out devices to cheapen the cost of production, but with the prices of raw material in other countries gradually approaching the quotations ruling on our markets, the engineers must more and more bestir themselves in the direction of discovering labor-saving machines for use in their workshops.—[Iron and Steel Trades Journal.

Composition of Natural Gas.

In a recent communication to the Franklin Institute Professor Francis C. Phillips gives the results of his exhaustive iuquiries into the chemical composition of natural gas, and also the relative value of the various gas wells as sources of fuel. He found that, as a rule, natural gas was a much less complicated compound than was generally supposed. The gas which is used largely in Pittsburgh, and comes directly, without any process of purification, from the Murraysville field, was found by him to be nearly pure methane gas, which contains by weight 74.97 per cent of carbon and 25.03 per cent. of hydrogen. In this respect this well differed from all the other wells which he examined. The gas supplied by the Bridgewater Natural Gas Company, of Rochester, Pa., which is produced wholly from one sand 1,200 feet below the surface, Raccoon creek in Beaver county, contained by weight 9.91 per cent. of nitrogen, 90.09 per cent. of paraffines and trace of carbon dioxide, oxygen and sulphuretted hydrogen, the paranffies containing 76.40 per cent. of carbon and 23.60 per cent. of hydrogen. The Baden wells, which are on the same anticlinal axes as the Raccoon creek wells, but produce gas from a sand about 1,396 feet below the surface, show 12.32 per cent. nitrogen, 87.27 per cent. of paraffines, .41 per cent. carbon dioxide and a trace of oxygen, paraffines containing by weight 76.44 per cent. of carbon and 23.56 per cent. of hydrogen. The Houston well at Canonsburgh, producing gas from a depth of 1,794 feet, shows 15.30 per cent. of nitrogen, 84.26 per cent. of paraffines, .44 per cent. carbon dioxide and traces of oxygen and ammonia, the paraffines showing 76.80 per cent. of carbon and 23.20 per cent. of hydrogen. In a general way it might be said that the sampl examined, contained hydrocarbons of the paraffine series, among which methane predominated.—[Progressive Age.

Chang Chih-tung Must be Subsidized.

The Viceroy of Canton, the famous Chang Chih-tung, has addressed a memorial to the Emperor, which contains a terrible indictment of kerosene oil. He brings a long series of charges against it. Not long ago it caused the destruction of 400 houses in Swatow; just before it burned a steamer to the water's edge, taking the lives of about 800 persons; shortly after it burnt out 1,000 families in Canton, and destroyed 10,000 dols. worth of property. It is responsible for nine-tenths of the fires occurring every Winter in the city of Canton, and therefore the Viceroy denounces it. He declares that it has done incalculable injury to life and property; that it is worse than opium, being more swift and terrible in its deadliness, and that it has almost destroyed the native industry in peanut, colza and bean oil. On account of these evil deeds the Viceroy did his best last year to kill the trade in kerosene by raising the inland transit dues, but in vain. The vitality of the destroyer was too much even for him, so he now approaches the throne to seek for aid in the struggle with the foreign trader who under the guise of friendship, insists on profiting himself by introducing an article highly injurious to the welfare of China. There is no difficulty, pursues his Excellency, in the way of putting a stop to the baneful traffic in this illuminant, because by a treaty of 1881, with America, provision was made to limit Chinese immigration to that country and prevent its increase, as the competition of Chinese labor was found to be objectionable, and "if they can prohibit our going there because Chinese labor is injurious to their interests, we have an equal right to prohibit the importation of kerosene when it is injurious to us."

A New Southern Industry.

A comparatively recent Southern industry, which promises to utilize hitherto almost worthless material is the manufacture of carpets or matting from the fibre of pine leaves. Since the action of the jute bagging trust has forced the cotton growers of the South to look about for a substitute for that article, attention has been directed to pine straw; and even should the effort to have it replace jute as a covering for bales of cotton fail, an impetus will have been given to its manufacture as carpet. By a peculiar process an oil, valuable for medicinal purposes, is extracted from the green leaves, which are then boiled in water mixed with alkali, to remove the silica, of which the leaf covering is composed. It now undergoes a series of operations to soften and release the fibres, and is finally dried thoroughly and packed in bales. Through all these processes the straw retains its peculiar aromatic odor. Physicians say that it possesses antiseptic properties which render it superior to cotton lint as a dressing for wounds. When made into carpet it resembles the finer grades of cocoa matting so closely that were it not for the smell, which gives an additional charm, it would be difficult to distinguish one from the other.—[Artisan.

English and American Machine Tools.

An American machine tool manufacturer has just returned from a trip to Europe, where he says he did a good deal of pure loafing, but not apparently without an eye to business. He finds a great difference in machine tool processes in England, as compared with this country. He looked through a number of establishments, and nowhere saw a quick-return arrangement on any planer or slotter, and hardly anywhere did he observe cut gears in use on machine tools. Other differences were noticeable, proving to his mind that an equal number of workmen operating American-made tools logically *ought* to do more work in a day than the same number of men operating English-made tools. He says an English concern had just got in about $10,000 worth of machine tools, built by an American manufacturer, and took considerable pleasure in showing them off to a prominent English builder, with the pleasant suggestion that *there* were some tools worth copying!—[American Machinist.

A CABLE message from the Liverpool Cotton Association announces that cotton baled with cotton sheeting, the new substitute for jute bagging, to which we referred last week, will be accepted as a good delivery. Thus, an effective blow seems to have been struck at the jute bagging trust.

CLEVELAND INDUSTRIES.

The Cleveland City Forge & Iron Company, completed last week the last piece of the ponderous machinery built by them for the Puritan. It is the connecting-rod, weighing, when finished, about 21 tons. It is 40′ long, and finishes 18′ 6″ diameter in the middle. Constant improvements are being made at these works. For the turnbuckle department a new brick and iron building has been erected 330′ long by 65′ wide.

There will be four large forging machines at work in this shop. A new one is being erected that will exert a force of 6,000 lbs. at the point of impact. The capacity of the mill will be about 2,000 turnbuckles a day. In this department are manufactured the Chapman Jack—a machine which is meeting with great favor and large sales. Next year the Forge Company propose to rebuild their entire main shop with brick and iron, a very wise conclusion, as their plant is entirely too valuable to run the risk of damage by the burning of the wooden sheds now enclosing it.

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The Kilby Manufacturing Company, occupying the premises where the Cummer Engine Company was located, have plenty of work on hand. They are now working on a contract with the Risdon Iron & Locomotive Works, of San Francisco, for over 50 carloads of machinery for the cable road at Los Angeles, Cal. In this work there are four wheels, 26′ in diameter, and 52″ face, one of which is now on the lathe. A better piece of work, both as regards the casting and finishing was never seen. They have nearly completed a mill for the American Wire Company, for rolling rods below No. 5.

They are the sole makers for five years, of the Yaryan apparatus for evaporating various liquids, and are now working on plants for Maine and Philadelphia.

These plants are shipped to all parts of the country, and, indeed, the world; plants made in this country, being in use to England, Wales, Germany, Demarara, Sandwich Islands, Cuba and Canada, and from Maine to Louisiana and California in the United States. Cleveland is advancing with steady and rapid strides towards a commanding industrial position.

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The Hill Friction Clutch Pulley Company, are building a new addition to their works. They will shortly place a new engine, manufactured by the Phœnix Iron Works, Meadville, Pa. Also several new boring and turning machines, and other tools. They intend remodelling their entire works. Report that trade never was better, and that they have orders on hand for five months ahead.

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The Lake Erie Iron Co. are setting up their new Porter-Hamilton engine to run their 9-inch mill.

William Tod & Co., of Youngstown, O., the builders of the engine, have their erecting engineer in town superintending the work.

Pig Iron Slag.

In a "comment" in the last impression of the *Iron and Steel Trades Journal*, we mentioned the fact that the cement manufacturers have rarely been so full with orders as they are at present. We hope the numerous firms of pig iron smelters noted our remarks, and that renewed efforts will be made to discover a reliable process of making cement out of the pig iron slag. There is an El Dorado for the successful discoverer of a process to utilize the mountains of pig iron slag which now disfigure such a large part of the landscape of the Midland and Northern districts. Many minds have been occupied with this question, but so far the progress made has not been encouraging. We recently announced that a patent had been taken out in connection with the utilization of pig iron slag for cement by Mr. Julius Schlesinger, of 16, Mark-lane City, and the iron smelters will no doubt await the results of this latest method with considerable interest. It is a certainty that some method of utilizing the slag will be discovered, and it only needs a lift from this source to render pig iron smelting a more profitable industry.

WHAT is probably the tallest smoke chimney in the world is now being completed at East Newark, N. J. The base diameter is 28 feet. It is solid brick to an altitude of 310 feet. At its top it is nine feet in diameter. A cast iron rim 20 feet in diameter, and a bell surmount the whole, and make the total height of the structure 335 feet. One million, seven hundred thousand bricks were used in its construction, and it cost $85,000.—[N. Y. Times.

Industrial Notes

Blast Furnaces:—

The Star Furnace, of Jackson, Ohio, has blown in, after a stoppage of two months for repairs.

Eliza Furnace, Eliza Iron Company, Wellston, Ohio, blew out last week, and will remain idle for at least the Winter months.

Lucy Furnace No. 2, Pittsburgh, Pa., has been undergoing thorough repairs. A new stove has been added. It will blow in shortly.

The Tallapoosa (Ga.) Furnace Company have lately purchased mineral and timber lands. Work is progressing on their furnace.

The Mt. Vernon ore mines, which have been idle for eight months, are being put in full operation, and will supply the Charlotte furnace, of Scottdale, Pa., with ore.

On October 3d, the head of the blast cylinder at the blast furnace of the Benwood Iron Works, at Martin's Ferry, Ohio, blew out. It will take some time to repair damages.

The Roane Iron Company, of Chattanooga, Tenn., intends adding three entire new hot blast ovens and remodeling No. 2 furnace. They expect to increase the output 20 tons per day.

Sharon Furnace, at Sharon, Pa., formerly operated by Boyce, Rawle & Co., but purchased some time ago by Spearman, Colcord & Co., will in the future be known as Mount Vernon Furnace

The Jefferson Iron Works, of Steubenville, Ohio, have decided to commence the erection of an additional blast furnace at an early date. It will measure 75x17 feet, and have a capacity of about 175 tons per day The contract will be let and work commenced on the furnace as soon as possible.

Fanny Furnace, at Shawnee, Ohio, operated by J. C. Hamilton, trustee, will resume operations in a few weeks. A new bosh has been put in, general repairs have been made, and a new brick casting house, 37x85 feet, is being put up to replace the old one, recently destroyed by a wind storm.

The furnace of the DeBardeleben Coal & Iron Company, at Bessemer, Ala., made during the month of September, in round numbers, 3,600 tons, or an average of 120 tons of pig iron per day. Since this furnace went into blast four months ago, over 14,000 tons of pig iron have been turned out.

Southern furnaces are said to be refusing further pig iron orders from the Eastern markets, and they are reported to be doing an excellent business in the Western States, from whence they have obtained numerous contracts at slightly better prices than they could get in the East. The Tennessee Coal & Iron Company's agents are declining any more orders for pig iron, their furnaces having on hand orders for all the iron they can turn out for some time to come.

The Mossbay Iron & Steel Company, of America, with offices at Seattle, W. T., has been incorporated by Peter Kirk, L. S. J. Hunt, A. A. Denny, W. W. Williams, Jacob Furth and H. A. Noble. The capital stock is $5,000,000. The corporation will build rolling mills and blast furnaces, operate collieries and iron mines. The erection of the buildings has already begun, and will be rapidly pushed to completion. Mr. Noble was formerly interested in the Baker Barbed Wire Company, at Des Moines, Iowa.

Early on Sunday morning last a gas explosion occurred at the Rosena Furnace, New Castle, Pa., owned by Oliver Bros. & Phillips, of Pittsburgh. The blast had been shut off from the stack for a few minutes, and the stopping of the air current caused a reaction which filled all the air pipes with gas. This ignited and exploded. The air pipes were shattered, and the three blast engines badly damaged. An area of 2,000 square feet was blown from the boiler house. Several workmen narrowly escaped death, but no one was injured. The loss is estimated at $8,000.—[American Manufacturer.

Rolling Mills:—

The Bessemer (Ala.) Rolling Mill Co. have added machinery for manufacturing corrugated iron.

Improvements are constantly in progress in the rolling mill department of the United States Rolling Stock Company's establishment at Anniston, Ala. Three new puddling furnaces are being placed in, another large steam hammer and all other apparatus for their successful working.

Andrews Bros. bought the sight of the Niles Co.'s mill this week for $3,500. It consists of about seventeen acres, was formerly owned by the Harris Blackford Co., and then the Niles Iron Co. The old mill was moved to Hazelton, and it is now predicted that Andrews Bros. will put up a new bar and sheet mill. It is a surprise to many that the plant was sold, as the Niles Iron Co. were not at all embarrassed and the property was worth much more money than it was sold for.—[Youngstown Herald.

Steel Works:—

The American Wire Nail Company, Covington, Ky., will add the manufacture of steel rods to its works.

The Harvey Steel Company will erect works at Newark, N. J., for the manufacture of steel by a new process invented by Hayward A. Harvey, of Orange.

Miller, Metcalf & Parkin, the well-known steel manufacturers, of Pittsburgh, will add to their works a department for the manufacture of common steel.

It is reported that the Pennsylvania Steel Company, at Steelton, has had a favorable experience with the Archer fuel gas. We understand that 1,026 tons of steel were heated in one day with a consumption of only 3 gallons of oil per ton of steel.—[Iron Age.

The Bethlehem Iron Company has shut down a part of its big mill, owing to its inability to deliver steel rails ordered by Southern companies because of the yellow fever. No vessel can be chartered for the South until the yellow fever has abated. One hundred men are out of work as a result.

In a short time the direct process will be used exclusively at the steel works. The company recently experimented with the process which takes the iron direct from the blast furnace and places it in the converter, with perfect success. This will do away with three cupolas now in use at the steel works, and also the men that run them.—[Bellaire Evening Tribune.

The new plant of the Allegheny Bessemer Steel Company, at Duquesne, Pa., about 25 miles from Pittsburgh, is rapidly nearing completion, and is expected to be ready for operations by January 1st. The Bessemer department is already finished, and filled with the most improved modern machinery. In the rail mill hydraulic working machinery will in nearly every instance take the place of roll-hands, furnacemen, shearsmen and hotbed men.

Foundries:—

The Forsman Malleable Iron & Cast Steel Company will build a foundry at Louisville, Ky.

A company known as the G. H. Grimm Manufacturing Company (iron works) has been incorporated at Hudson, Ohio.

Sweeney's foundry, at Wheeling, W. Va., is quite busy just now with some large castings for the new plate glass works which is being constructed at Cochran's Station, Pa.

The Chelmsford Foundry Company are erecting a new pattern shop at their works at North Chelmsford, Mass. It is 40x80 feet, two stories high, and built of brick. Business is active at this foundry.

The Cochrane Roller Mill Supply Company, of Dundas, Ont., are rapidly completing their new works at Escanaba, Mich. They will have their own foundry for making iron castings. They expect to employ 1,000 men when in full operation.

The Falcon Foundry & Machine Works, of Youngstown, Ohio, are building for the Warren Iron & Steel Co., of Warren, Ohio, a heavy scrap shearer. It cuts up to 5″ round iron. Report trade very good, and running full time with a full force. The additions to their works are all completed.

The Williamson Iron Co.'s foundry, at Birmingham, Ala., is crowded with work in all departments, and there are still many orders ahead. The foundry, machine and boiler shops are working full forces. A new set of immense hoisting machines have recently been manufactured for the DeBardeleben Coal & Iron Company.

At the Iron City Foundry of L. M. Morris on Twenty-third street, Pittsburgh, the usual force is busily employed in getting out ingot moulds. Some extra large sizes are being sent to the Edgar Thomson works to be used in casting ingots for the Government order of steel plates. The "green sand" side of the establishment is busy on blast furnace work.

Miscellaneous:—

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 27th day of October, 1888, for furnishing the plaster models for ornamental work required for the Federal building, in course of construction at Brooklyn, N. Y.

Muncie Nail Co., Muncie, Ind. Capital, $200,000. W. D. Durham and others, incorporators.

Canton Steel Roofing Co., Canton, O. Capital, $50,000. T. C. Snyder and others, incorporators.

Oregon Foundry Co., Oregon, Ill. Capital, $300,000. Frederick G. Jones and others, incorporators.

Hinson Car Coupler Co., Des Moines. Capital, $2,500,000. George Lendum and others, incorporators.

Steel Heater Manufacturing Company, Chicago; capital stock, $1,500,000; incorporators, Wilbur F. Steele, William Frimshawand, J. M. LeBolt.

F. M. Stowe, of Winneconne, has solved the problem of tempering brass. He has shown an edged tool that will cut a seasoned pine or hemlock knot without affecting the tool, and the various tests he has made proved it superior to steel for cutting purposes, as it takes altogether a finer edge.—[Milwaukee Sentinel.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 27th day of October, 1888, for furnishing the plaster models for ornamental work required for the Federal buildings, in course of construction at Abingdon, Va. and Binghamton, N. Y.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 13th day of November, 1888, for the labor and materials required in the erection and completion of the U. S. Court House, Post Office, etc., at Chattanooga, Tenn., (except the general excavation, the heating apparatus, etc., the plumbing and the approaches).

The Birmingham (Ala.) Bridge & Bolt Works are crowded with orders, and running to their utmost capacity. New contracts are being received almost daily from all parts of the State. One of the largest contracts received by this company recently was for manufacturing a number of large new iron railroad bridges for a new road in course of construction in the southern part of the State.—[Birmingham Age.

The Swindell Construction Company, of Pittsburgh, is now engaged in remodeling the tube department of the Riverside Mill, at Wheeling, for the use of manufactured gas. The other departments of the mill were originally constructed for the use of manufactured gas, the appliances for which will answer equally well for natural gas, while those of the tube department were made exclusively for natural gas, which necessitates a thorough overhauling and change in the furnaces before manufactured gas can be used.

The Baldwin Locomotive Works, Phila., are exceedingly busy completing orders on hand. The last consignment of the order for sixty locomotives for the Reading Company was made last week. The Pennsylvania railroad has contracted for 50 eight-driver freight locomotives, and 20 have been delivered. A shipment of 10 narrow gauge locomotives to the Mexican National railway made last week, filled 30 cars. It is expected that the record for the year will be 730 locomotives, or more than two daily.—[American Manufacturer.

The Central Dock & Terminal Company, of Buffalo, has prepared plans for its new trestles and pockets of 6,000 tons capacity, to be erected near the Erie Basin, and its construction, instead of being along the shore line, will be extended out about 750 feet so that vessels can be loaded from both sides of the trestle. Connection will be made with the N. Y. C. & H. R. R. by two tracks, while the trestle will have five tracks in all. The coal interests of this railroad and the Philadelphia & Reading, as well as that of J. Langdon & Co., will be taken care of by this arrangement. The works will be completed early next year, in time for the opening of navigation.

The Lehigh Valley Company has begun the construction of a 2,200 tons pocket capacity trestle at South Buffalo, N. Y., the works to be completed by December 1st. The trestle is to be used for the handling of bituminous coal for locomotives and for transferring to line cars for Western shipment. The trestle will be double with thirty pockets on each side—sixty in all—and will be 1,200 feet long. This company has also placed contracts at Cleveland, O., for the construction of two steel propellers, to be practically duplicates of the E. P. Wilbur. With the addition of these two crafts the company will own nine first-class vessels of great speed, large capacity and economy of fuel.—[Black Diamond.

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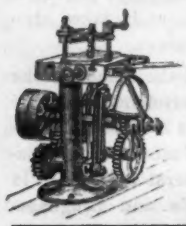

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Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 101 St. Clair St. 81

PICKANDS, MATHER & CO., Iron Ore and Pig Iron, Cor. Bank and Superior Sts. 61

SANGER, A. I., wholesale Scrap Iron. Nos. 173, 175 & 177 Merwin Street. 33

File Works.

INDUSTRY FILE WORKS, A. & H. Gough, manf'rs of Files and Rasps, equal to the best English file. Old files re-cut. All kinds of Job Grinding. Office and Works, 38 Columbus and 38 Winter street 13

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TAYLOR & BOGGIS FOUNDRY CO. Fine Gray Iron Castings. 65 to 73 Central Way.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a specialty. Nos. 426 to 432 Broadway. 64

Foundry Facings.

CLEVELAND FACING MILLS, Foundry Facings, Cor. Scranton & Carter Sts. 21

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THE EBERHARD MF'G CO. manfrs of Carriage, Wagon and Saddlery Hardware. 25

Hardwood Lumber.

MARTIN & BARRISS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Lumber.

FISHER, WILSON & CO., Wholesale lumber dealers (pine & hardwood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way. 82

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FLEHARTY, J. H. & Co., Rubber Stamps, Seals, Stencils. 92 Seneca street 54

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MONEIL, J. C. CO., Steam Boilers, Heavy Sheet Iron Work, &c. Repairing promptly executed.

TAPLIN RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc. 04

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Canton, O.

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CURRY & CO. general jobbers in Castings of all kinds. 48

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REEVES BROS., Manufacturers of Boiler Tank and Sheet Iron Work, etc 84

Struthers, O.

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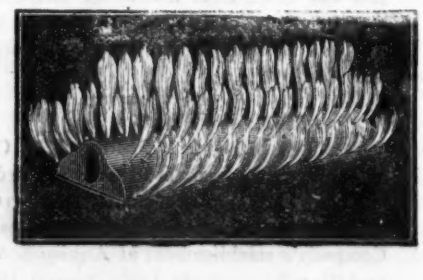


MARKET REVIEW.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, O., WEDNESDAY EVENING, October 17, 1888.

Iron Ore.

The situation foreshadowed some weeks since in these columns can be better understood when it is stated that the Philadelphia & Reading Railway Company has this week placed an order for two thousand combination coal and ore cars. The Reading & Lehigh Valley roads have carried some considerable ore this Summer, and they like the experience sufficiently well to wish for an increase. Inquiries for Winter prices continue strong, and in some instances, pressing. One local firm has been requested to make a bid for 20,000 tons of Bessemer ore to be delivered in Chicago in January, and another firm has rejected an offer for 30,000 tons of a high grade of ore for June delivery, at an advance of 90 cents over the price last paid, for the same class of ore. Ore dealers themselves are surprised by the continued demand for ores of every grade, but having nothing more to sell, they have time for regretting the cheap sales made during June and July. It may now be predicted that 1889 prices will be fully established next January.

Pig Iron.

According to authentic reports, the weekly output of the bituminous and charcoal furnaces of the U. S. exceeds, at this time, by some ten thousand tons, the weekly output of six months ago. Yet notwithstanding this heavy addition to manufacture, representing half a million tons of pig iron a year, the pig stocks which six months ago amounted to rather more than 360,000 tons have dwindled to 155,000 tons, a reduction of about 58 per cent. During the month of September alone, the reduction exceeded 30,000 tons, and the present consumption of pig iron of all the grades manufactured is at the rate of seven million tons a year. Local furnacemen have but little iron for sale, their capacity having long since been engaged until the close of the year. For what little extra iron they make, they receive good prices since neither mill men nor founders seem to be able to secure all the metal they can make use of in the course of their business. We quote f. o. b. Cleveland, four months.

CHARCOAL PIG IRON.

Lake Superior Charcoal all numbers	22 00@24 50

BITUMINOUS AND COKE IRON.

No. 1 Bessemer	$18 70@19 20
No. 1 foundry, all lake ores	18 20@18 70
No. 2 same	17 20@17 70
No. 1 foundry, lake ores, with cinder mixture	17 20@17 70
No. 2 same	16 20@16 70
No. 1 silvery, native Ohio ores	16 50@17 50
No. 2 same	15 50@ 6 50
No. 1 gray forge, red short	16 70@17 20
No. 1 gray forge, neutral	16 20@17 70
No. 1 American Scotch (Black Band)	17 70@18 20
No. 2 American Scotch "	16 70@17 70

Manufactured Iron.

The steel rail business is flattening out, day by day, but steel bars are rapidly coming to the front, especially in the Western market. The demand for structural iron has lessened of late, owing to the approaching close of the building season. Bar iron is a trifle stronger, and sheets continue scarce and high.

Scrap Iron.

Little change is reported in the rail corner, the price being still high. It is evident, however, that with the continuation of the excessively high prices, stocks are accumulating so rapidly that a break must be an inevitable consequence. Wrought scrap brings good prices, as do axles.

Hardware.

Dealers and jobbers report a heavy trade in heavy hardware and shelf goods, and anticipate a rise in metals.

DETROIT PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by William F. Jarvis & Co.

The market remains unchanged, and while there is considerable buying, yet manufacturers do not desire to make any further advance at present, but full prices are obtained for all orders taken. Buyers continue to request shipments hurried to them, and in many cases stocks are allowed to run so low before orders are given that should any delay occur on account of the furnace not having the particular grades when order is received, the consumer is put to considerable trouble and expense on account of the delay. Several orders for round lots from desirable customers at full prices have been refused by furnaces during the week, on account of the delivery being after January 1st. With a steady and firm market, we quote as follows (Oct. 15):

Lake Superior Charcoal, all numbers, $20 00@$20 50; Lake Superior Coke, all ore, $19 75@$20 25; Lake Superior coke, cinder mixed, $18 50@$19 00; Standard Ohio Blackband, $19 75@$20 25; Southern No. 1, $17 75@$18 25; Southern Gray Forge, $16 25@$16 75; Southern Silvery, $17 00@$17 50; Jackson County (Ohio) Silvery, $18 50@$19 00; Old Wheels, $20 50@$21 50.

CINCINNATI PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

Since last report, the market has been slowly gaining strength and activity. Inquiries are much more numerous than the first week in the month, and the volume of transactions is heavier. The business is widely scattered, as to sources of demand and kinds of metal called for. A feature that speaks of the slowly swelling current of general business, is the marked increase in quantity purchased by small jobbing and special foundries throughout the West. Apparently most of them enjoy greater activity than at any time in recent years. Heavy traffic on the railroad has delayed shipments some, and caused trouble around foundries running close on supply. We quote for cash f. o. b. Cincinnati (Oct. 13):

HOT BLAST FOUNDRY.—Ohio and Southern Coke. No. 1, $16 50@$18 00; Ohio and Southern Coke, No. 2, $15 75@$17 00; Ohio and Southern Coke, No. 3, $15 00@$16 00; Ohio Soft Stonecoal; No. 1, $17 00@$17 50; Ohio Soft Stonecoal No. 2, $15 50@$16 00; Mahoning and Shenango Valley, $17 50@$18 50. CHARCOAL IRON.—Hanging Rock Charcoal No. 1, $21 00@$22 50; Hanging Rock Charcoal No. 2, $19 50@$22 00; Tennessee and Alabama Charcoal No. 1, $18 50@$19 50; Tennessee and Alabama Charcoal No. 2, $17 50@$18 00. FORGE—Strong Neutral Coke, $14 75@$15 00; Mottled Neutral Coke, $13 75@$14 00; Cold Short Coke, $14 50@$14 75. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@25 00; Hanging Rock Cold Blast, $22 00@$25 00: Lake Superior Malleable & Car Wheel, $21 00@$22 00.

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

The market has been satisfactory during the past week, with a fair amount of sales. The manufacturers state they have enough work to keep them busy until the close of the year, and think as soon as the election is over, that orders will increase rapidly. The car companies are running full time, and the business outlook is very good. Old rails are quiet, but there is a strong demand for old wheels. We quote as follows (Oct. 15):

Southern Coke, No. 1, Foundry, $17 00@$18 00; Southern Coke, No. 2, Foundry, $16 00@$16 50; Southern Coke, No. 2½, Foundry, $15 50@$16 00; Hanging Rock Coke, No. 1, Foundry, $17 25@$17 75; Hanging Rock Charcoal, No. 1, Foundry, $21 00@$23 25; Southern Charcoal, No. 1, Foundry, $18 00@18 50; Silver Grey, different grades, $14 50@$15 25; Southern Coke, No. 1, Mill Neutral, $14 75@$15 25, Southern Coke, No. 2, Mill, Neutral, $13 75@$14 75; Southern Coke, No. 1, Mill, Cold Short, $14 25@$14 75; Southern Charcoal, No. 1, Mill, $15 75@$16 50; White and Mottled, different grades, $13 50@$13 75; Southern Car Wheel, Standard Brands, $23 00@$24 00; Southern Car Wheel, other brands, $19 25@$21 25; Hanging Rock, Cold Blast, $22 25@$25 25; Hanging Rock, Warm Blast, $19 25@$20 25.

CHICAGO PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co., W. W. Backman, Resident Agent.

A distinctly better feeling is noted here. Buyers seem to have no fear in taking hold at current prices and many of them endeavor to buy as far ahead as possible at current prices. The strengthening prospect of a decision in favor of the protection of American industry at the polls next month has given renewed courage to many who attach great importance to that result in next year's business. Lake Superior charcoal iron is held firm at $20 to $21 cash, at Cnicago, and very little could be bought at that figure. We quote for cash, f. o. b., Chicago (Oct. 13):

Coke and Bituminous Coal Foundry:—Ohio (Hanging Rock softeners), $18 50@19 00; Ohio (Black Band softeners), $18 50@19 00; Ohio (Jackson county softeners), $18 25@18 75; Lake Ore and Cinder softeners, $17 75@18 25; Southern coke foundry No. 2, $17 50@18 00; Southern coke foundry No. 2½, $17 00@17 50; Southern coke foundry No. 3, $16 50@17 00. Old material:—Old iron rails, $24 00@25 00; Old car wheels $19 00@20 00. Charcoal Foundry:—Lake Superior, $19 50@21 00; Southern, $19 50@21 00; Hanging Rock, $21 00@23 50. Car Wheel and Malleable:—Lake Superior, $19 50@21 00; Standard Southern, $21 50@26 50; Hanging Rock Cold Blast, $24 50@27 00; Hanging Rock Warm Blast, $22 50@24 50.

PITTSBURGH PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by A. H. Childs.

The market is practically unchanged, but there has been rather more disposition to realize, on the part of some holders of pig iron, and prices have shown more weakness in consequence. Buyers claim that good gray forge metal can be had at $16.00 cash, or even less, while many furnacemen are holding out for $16.50. Quotations are (Oct 15):

PIG IRON.—No. 1 Foundry, $17.50@$18.50; No. 2 Foundry, $17.00@$17.50; Gray Forge, $16.50@$17.00; White and Mottled, $15.00@$16.00; Warm Blast Charcoal, $22.00@$25.00; Cold Blast Charcoal, $24.00@$28.00; Bessemer, $18.50@$19.50.

ST. LOUIS PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co

The market here has not been active during the last week. A small run of moderate sized orders has been placed, but nothing of much moment. There is no weakening in the market, but only a lull. A little later there is likely to be quite a heavy inquiry for actual current needs, and a better feeling is looked for then. Furnaces instead of being anxious to sell, seem anxious to hold off, and address themselves to reducing overfilled order books. We quote for cash, f. o. b., St. Louis (Oct. 13):

Charcoal Foundry—Southern No. 1, $18.50@$19.50; Southern No. 2, $18.00@$19.00; Missouri No. 1, $17 00@18 00; Missouri No. 2, $16.50@$17.50. Coal and Coke Irons.—Southern No. 2, $16 50@$18 00; Ohio Softeners, $18 00@21 00. Mill Irons—Southern No. 1, $15 00@$16 50; Southern No. 2, $15 00@16 00; Missouri, $16 00@16 50. Car Wheel & Malleable Irons.—Southern, $20 00@24 00; Lake Superior, $20 50@21 50; Connellsville Coke, East St. Louis, $4 45; Connellsville Coke, St. Louis, $4 60.

Twin Screws and Triple Expansion Engines.

Railroad Gazette.

Twin screws driven by triple expansion engines have in so many cases proved more effective and economical than the side-wheelers and propellers, built a few years ago, that the question of converting old side-wheel steamers into twin screws is likely to arise. The experience of an English railroad company in this direction is therefore interesting. The London & Northwestern Railway, some months since, placed their paddle-wheel steamer "Duchess of Sutherland," (built in 1869) in the hands of Messrs. Laird Brothers for conversion into a twin-screw steamer with the expectation that her efficiency for their cross-channel cattle trade would be improved, and that considerable gain in economy would result from the introduction of more modern machinery. The work has been completed, and on a recent trial trip the vessel ran 14½ knots, the engines developing 1,400 horse-power. The old machinery, side wheels and boxes were removed, but the forward and after sponsons or guards, and their houses on each side are retained and connected, the houses forming quarters for the ship's officers, store rooms, etc. The old side-wheel space is decked over, and formed into a large additional space for cattle. The necessary alterations have been made about the stern of the vessel, and stern tubes and brackets fitted, and the arrangement of engine keelsons, bulkheads, coal-bunkers, etc., have been modified to suit the new machinery. This consists of two sets of triple expansion engines having cylinders 16½-inch, 26-inch and 41-inch diameter, with a stroke of 30-inch, and working at 150 lbs. pressure, steam being provided by two double-ended cylindrical Scotch steel boilers. The carrying power of the vessel has been increased by about 190 tons, large additional deck space for cattle gained, while the net register tonnage has been reduced by 247 tons. The speed has been considerably increased, and the consumption of fuel reduced 60 per cent.

Change of Nomenclature of Southern Coke Iron Grading.

The system of grading pursued by Southern coke furnaces in the past having been peculiar to the district, and out of line with the grading followed by Northern furnaces, it has been determined to so change the nomenclature of Southern grading as to make it conform to the standard common throughout the country. Therefore, on and after October 1st, 1888, the following schedule will be uniformly pursued:

No. 1 foundry, same as hitherto called No. 2.
No. 2 foundry, same as hitherto called No. 2½.
No. 3 foundry, same as hitherto called No. 1 mill.
No. 1 soft, same as hitherto called open bright.
No. 2 soft, same as hitherto called close bright.
Silver grey, the same as hitherto called silver grey.
Grey forge, the same as hitherto called No. 2 mill.
Mottled, the same as heretofore called mottled.
White, the same as heretofore called white.

Sales agents will invoice, in accordance with this schedule, all shipments on new orders, and also those on orders taken before this goes into effect and not yet completed.—[Tradesman.

LIST OF PATENTS.

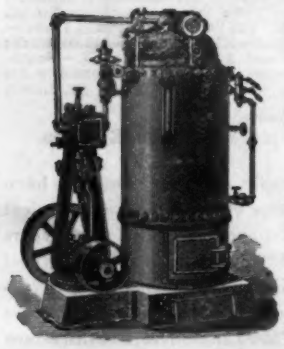
Relating to Iron, Steel, Metal, Machinery, Hardware and Mining Interests.

Reported expressly for this paper by H. T. Fisher, (late Ex. U. S. Patent Office), Patent Attorney, 34 Blackstone Building, Cleveland, O.

BEARING DATE OCTOBER 9, 1888.

Casting metal ingots, J. Illingworth, Newark, N. J.
File-cutting machines, ch set-holder for, H. Michel, Detroit, Mich.
Glass labels, furnace for heating, J. L. Dawes, Pittsburgh, Pa.
Glass panels, metallic frame for, A. Nacke, Philadelphia, Pa.
Ingots, apparatus for forming compressed steel, W. H. Singer, Allegheny, Pa.
Iron into steel, converting cast, J. Hooper and T. Clark, New Albany, Ind.
Metal-cutting machine, O. C. Little, Menasha, Wis.
Metallic wheel, E. R. Kinney, Toledo, O.
Nail machine, wire H. Cameron, Boston, Mass.
Ore concentrator and amalgamator, J. D. Coplin, Denver, Colo.
Ores, stack furnace for reducing, A. T. Hay, Burlington, Iowa.
Saw-swaging machine, A. S. Parke, Bay City, Mich.
Shingle, metallic, W. E. Warren and R. S. Dudley, West Point, Va.
Tubes, machine for corrugating wrought metal, R. F. Pratt and C. D. Wainwright, Medford, Mass.

THE CLINE ENGINES.



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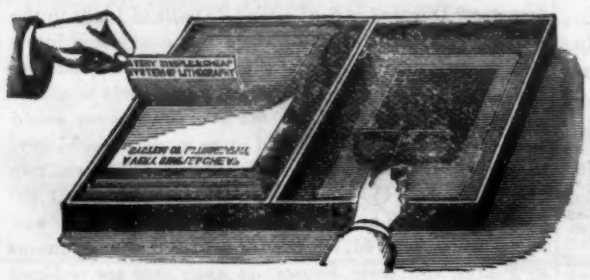

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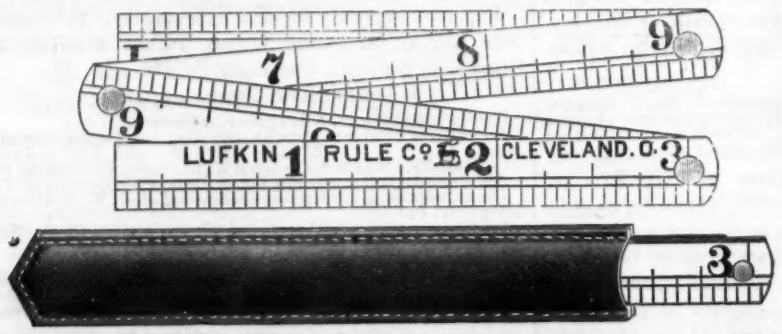

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Tin enamele d.....dis 40@
Family, Handy.....dis 45

Grindstone Fixtures.

Sargent's.....dis70

Gun Wads.

U. M. C. & W. R. A.—B. E., 11up...2 00
U. M. C. & W. R. A —B. E., 9&10...2 30
U. M. C. & W. R. A.—B. E., 7&8.....2 60
U. M. C. & W. R. A.—P. E.. 11up...3 10
U. M. C. & W. R. A.—P. E.. 9&10....4 00
U. M. C. & W. R. A.—P. E., 7&8.....4 90
} dis 20&2
Eley's B. E., 11 up.....2 00
Eley's P. E..11@20.....2 80

Hack Saws.

Griffin's Hack Saws, complete.....dis 40
Griffin's Hack Saw, Blades only.....dis 40
Diamond Hack Saws and Blades.....dis 25

Halters.

Jute horse and cattle ties.....$13.50 gro. net.

Hammers.

Maydole s.....discount 25@25&10
Atha new list, Jan 15,1887.....dis 40&10@50
Magnetic Tack, No. 1, 2, 3, $1.25, $1.50 and $1.75, dis 30
Heavy hammers and sledges under 5 lbs,36c,over 5lbs, 30 c.....dis 70

Hand Cuffs and Leg Irons.

Providence Tool Co., hand cuffs, $15 ₱ doz...dis 10
Providence Tool Co., leg irons $25 ₱ doz.....dis 10
Tower's.....dis 15

Handles—

Door or Thumb Latches.

Per doz	Nos. 0	1	2	3	4	
Sargent's	90	1 00	1 18	1 35	1 50	dis 60&10

Roggin's Latches.....₱ doz. 30@35c
Bronze Iron Drop Latches.....₱ doz. 70c net
Jap'd store door handles—Nuts. $1 62; Plate $1 10; no plate $0 88.....net
Barn door.....₱ doz $1 80, dis 25
Wrought chest.....dis 50&10&10
Surface chest.....dis 70
Flush chest.....dis 70
Lifting.....dis 70
Saw and plane.....dis40&10
Hammer and hatchet.....dis 25&5&2
Brad awl.....₱ gross $2
Hickory firmer chisel, assort.....₱ gross $4 50
Hickory firmer chisel, large.....₱ gross $5 00
Apple firmer chisel, assorted.....₱ gros $5 00
Apple firmer chisel, large.....₱ gross $6 00
Socket firmer chisel, assorted.....₱ gross $3 00
Socket framing chisel, assort.....₱ gross $5 00
} dis 40
File, assorted.....₱ gross $2 75
Auger, assorted.....₱ gross $5 00
Auger, large.....₱ gross $7 00
} 25

Hangers.

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Richards.....dis 20&10u&10

Harness Snaps

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Covert, New Patent. new list.....dis 50&5&2

Hay Knives.

Lightning.....per doz. $11.50 net
Electric.....₱ doz $17.00 dis 30

Hinges.

Wrought Strap and T Hinges.....65&10&2@70&10
Screw, hook and strap, 8 10 12 in.....3⅔@4
to 36 in.....2¾@3
Screw hook & eye hinges...½ ₱ doz 1.50
⅝ 2.45
¾ 3.80
...dis 10
Gate, western.....₱ doz $4 40, dis 55
Gate. N. E.....₱ doz $7 00, dis 55
Gate. N. E. reversible.....₱ doz $5 20, dis 55&15
Gate. Clark's. Nos. 1. 2. 3.....dis60&10@60&10&0
Gate. N. Y. State.....₱ doz $5 00, dis 55&15
Gate, automatic.....₱ doz $12 50. dis 50
Gate, common sense.....₱ doz pair $4 50, dis 50
Gate, Shepard's.....dis 60&1

Hollow-Ware.

Stove Hollow-Ware. Ground dis.....60&10&10
" " Underground.....70&10
Enameled Kettles.....dis 70
Saucepans.....dis 40
Galvanized Tea-Kettles

Inch	6	7	8	9
Each	55	60	65	75

Hoes.

Garden. mortar.....dis 65&5
Planter's. cot.....dis 65&5
Canton.....dis 65&5

Hog Rings and Ringers.

Hill's rings.....$2 50
" ringers. { Old Style.....$3 00 / Improved.....$4 50
Blair hog ringers.....₱ doz $3.00

Hooks.

Bird Cage, Sargent's list.....dis 60&10&10
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Coat and Hat. Sargent's list.....dis 55&10
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Hooks and Eyes—Brass.....dis 60&10&10

Horse Nails.

No.	10	9	8	7	6	
Ausable. ₱ lb.	23	24	25	26	28	dis25&10to25&10&10
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Essex.....33⅓&5

Burden.....₱ keg $4.25
R. I. Horse Shoe Co., Perkins' Imp. at factory.....₱ keg $4 25
Mule Shoes, at factory.....₱ keg $5.25

Hose, Rubber, Boston Belting Co's.

Standard.....70
Extra.....55&10
Best.....45&10

Ice Picks, Chisels, &c.

Am. Ice Chisel Pol'd.....₱ doz. $3.00, dis20

Ice Cream Freezers.

American.....50&10
Gem.....55&10
Crown.....50&10

Ice Tongs.

Champion.....₱ doz $4.00, dis 25&10
Family.....₱ doz $2.75, dis 20@25

Jack Screws.

Illinois Bolt Co. list.....dis 70

Kettles.

Brass. 7 to 17 inches inclusive.....₱ lb 22c. net.
Brass larger than 17 inches.....₱ lb 24c.
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Keys.

Eagle. cabinet, trunk and padlock...dis 33⅓ and

Knives.

Russell's Butcher.....net
Moran's Shoe Knives.....dis 20

Knobs.

Carriage, Japanned.....₱ gross 80c. dis 60&10
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Door Por. Jap'd.....90c
Door Por. Por.....3 00@3 25
Door Por. Plated.....2 90@3 00

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" " 1.....7 00
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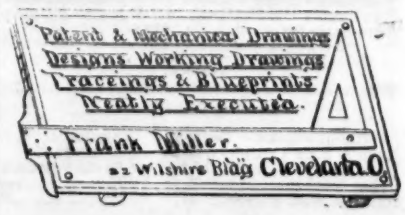

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Escutcheons and keys .....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
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Lines.

Cotton Chalk.....dis 40
Silver Lake, Braided, N , 0, $6.00; No. 1. $6.50; No. 2, $7.00; No. 3, $7.50 ₱ gross .....dis 25
Masons' Linen.....dis 40
Wire Clothes, No 18, $3.75; No 19, $3.25; No. 20 $2.75;.....

Mallets.

Hickory .....dis 20&10
Lignumvitæ.....dis 2(&10
Penfield Block Co., Lignumvitæ and Hickory.....dis 30

Mattocks.

Regular list.....dis 60@60&5

Meat Cutters.

	1	2	3	4	
Dixon's (P.S.&W.)	₱ doz. $14.00	$17.00	$19.00	$30.00	dis 4(
Draw Cut Nos.	5	2	6	8	10
Each.....	$50.00	$75.00	$80.00	$225.00	400.00

dis 20@25

Woodruff's (P S & W) per doz No 100 $15 No 150 $18dis 45

Hale's—Nos. 11 12 13
$27 $33 $45 dis 70

Enterprise.....dis 33⅓

Mincing Knives.

Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Smith's, ₱ doz. single, $4 50; double, $6 50 dis 40

Money Drawers.

Tucker's ₱ doz.....$18 @20

Molasses Gates.

Stebbins' pat .....dis 70
Stebbins' genuine .....dis 66⅔&10
Stebbins' tinned ends.....dis 40&10
Lincoln's pattern.....dis 66⅔&10
Scoville.....$7 45&10

Nails (wire).

List July 14 1887.....dis 70
Standard Penny Nails, ₱ keg card rate
Car lots.....$2 60
Less than car lots, $2 70

Nuts and Washers.

Size of bolt in.....	¼	5-16	⅜	½	⅝	¾	1
Square.....	8¼	7	5½	4¼	4	3½	3⅛
Hexagon.....	15½	11½	8½	6	5¾	5¼	5
Washers.....	9	8	7	5	4½	4½	4¼

In lots less than 100 lbs, ₱ lb add ½c, 1lb boxes add 1c to list

Nut Crackers.

Table (Humason & Beckley Mfg. Co.).....dis 40
Blake's pattern.....₱ dos. $2 00, dis 10
Quakenbush.....$5 00 net

Oakum.

Government.....₱ lb 8 c
U. S. Navy.....₱ lb 7½c
Navy .....₱ lb 6½c

Oilers.

Zinc and Tin.....new list dis 60&10
Brass and Copper.....new list dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz.....dis 10@ 10&10

Packing, Steam.

Boston Belting Co .....dis 60
American Packing. .....10@11c
Russia Packing.....16c
Italian Packing.....16c

Pencils.

Faber's Carpenters' .....high list, dis 50
Faber's Round Gilt.....₱ gro $5.25 net

Picks.

Railroad, 5 to 6 lbs.....$12 dis 60@60&5
... .. 6 to 7 lbs.....$13 dis 60@60&5

Pinking Irons.

₱ doz .....65c. net

Picture Nails.

Brass head, Sargent's list..... } dis 50&10&10
rass head, combinat'on list.....dis 50&10
Porcelain head Sargent's list, dis.....50&10&10
Porcelain head, combination list.....dis 40&10

Plane Irons.

Sandusky Tool C ..... dis 20&10

Pliers and Nippers.

Button's Patent .....dis 40
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 4 in., $21 00 ₱ Doz. .....dis 20&10@33⅓
Gas Pliers.....dis 50&10
Humason & Beckley .....dis 50
P. S. & W. Tinners' Cutting Nippers add 6 per cent. dis 10

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Post Hole and Tree Augers.

Samson Post Hole Digger..₱ dos. $36.00, dis 20&10
Eureka Diggers.....₱ dos. $15.00 @ $16.00
Champion.....per dos $9.00
Vaughan's Hollow Tube Post Hole.....$12.00 dis40

Potato Parers.

White Mountain.....₱ dos $5.00@$5.50
Antrim Combination.....₱ dos $8.00
Hoosier .....₱ dos $13.50

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw ₱ dos $18.00.....dis 25
Disston's Pruning Hook.....₱ dos $12.00 dis 25
Pruning Shears .....₱ dos 3.75@$4.00 net

Pulleys.

Hot House ..... discount 60&10
Japanned Screw..... discount 60&10
Brass Screw.....discount 60&10
Japanned Side.....discount 60&10
Japanned Clothes Line.....discount 60&10

Pumps.

Cistern, best makers.....dis 50@10&60
Pitcher spout, best makers...dis 60&10@60&10&10
Pitcher spout, cheaper goods... dis 70&5@70&10&5

Punches.

Saddlers' or Drive....₱ doz. good quality. 65@75c
Bemis & Call Co.'s Cast Steel Drive.....dis 50&5
Bemis & Call Co.'s Springfield Socket.....dis 50&5
Solid Tinners.....₱ doz. $1.44, dis 55

Rails.

Sliding Door, Wrought Brass.....₱ lb 35c dis 20
Sliding Door, Iron, Painted... ₱ foot 6c dis 40&10

Rakes.

Cast Steel..... dis 65&5
Malleable ..... dis 65&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher..... $10 @£...dis 10
Rifle Razor.....$9 50 net

Rivets.

Iron, Thousand, list November 17 .....dis 50
Iron, Ordinary, Cooper's Block and Carriage, list November 17.....dis 50
Copper .....dis 50

Rods.

Stair, Brass.....dis 25&2

Rollers.

Barn door, Sargent's list, ... dis 60&10&10
Acme (Anti-Friction).....dis 55

Rope.

Manilla, ½ inch and over.....11½c
Sisal, ½ inch and over.....11c

Rules.

Boxwood..... discount 80@80&10

Sad Iron.

From 4 to 10 lbs.....per 100 lbs 3c
Self-heating.....₱ doz $9 net
Self-Heating, Tailor's.....₱ doz $18 net
Mrs. Potts's Irons, ... dis 40&10
Enterprise Star Irons.....discount 40&10

Sash Weights.

Per ton .....$22.50@$25.00

Saws.

Disston's Circular..... discount 45
Disston's hand panel, rip &c..... discount 25
W. M. & C., Champion Regular.....per foot 23c
W. M. & C., " Thin Back.....₱ ft 24c

Saw Frames.

White, Vermont.....₱ gross $12 00
Red, polished & varnished ₱ doz $1.50, ...dis 25

Saw Sets.

Aiken's Genuine.....$13.00, dis 50 &10
Morrill Saw Sets No. 1 $15.00; No. 3 and 4 $24.00 .....dis 40 &10

Scales.

Hatch, Counter, No. 171 .....₱ doz $21.00
Hatch, Tea, No. 161.....₱ doz $6.75@7 00
Chatillon's Grocers .....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882 dis 50&10

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.) $6.50.....dis 30&10
Box, 1 Handle.....₱ doz $4.00, dis 10
Foot.....dis 50&10

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles dis 65&10
Stanley R. & L. Co.'s Black Handles.....dis 60&10
Sets Interchangeable.....₱ doz $18.00 dis 25

Screws.

Wood Screws—List Jan 27, 1881.

Flat head iron	dis 70	Extra ....10 Soften given
Round head iron	dis 65	
Flat head brass	dis 65	
Round head brass	dis 60	
Flat head bronze	65	
Round head bronze	60	
Machine, flat head, iron	dis 55	
Machine, round head, iron	55	

Bench and hand—

Bench, iron	25&10
Bench, wood, beech, per dozen $2.25	
Bench, wood, hickory	20 & 10
Hand, wood	20&10
Lag or coach.....dis	66⅔@70
Coach, patent gimlet point.....	66⅔@66⅔&5
Bed	25&5
Hand rail,	66⅔&10

Saw Tools.

Atkins' patent.....₱ doz sets $6 00

Shears.

American (Cast) Iron.....dis 75&10
Pruning .....See Pruning Hooks and Shears
Garnard's Lamp Trimmers.....₱ doz $4.00
Tinners'.....dis 20&2
Seymours List, Dec. 1881..... dis 60 &10&5
Seymours Tailor's Shears.....dis 33⅓

Scroll Saws.

Lester, complete, $10.00..... ...dis 25
Rogers, complete, $4.00. .....dis 25

Sheaves.

Sliding Door R. & E. list Dec 18, 1885... dis 55&2
Sliding Door, Patent Roller.....dis 60&10&2
Sliding Door, Pat'nt Roller, Hatfield's..... dis 70
Sliding Door, Corbin's Anti-Friction Dec. 18, 1885 dis 60&2

Ship Tools.

L. & I. J. White.....dis 20 & 5

Shovels and Tongs.

Iron Head.....50&10&5
Brass Head.....50

Sieves.

Metallic, new list.....dis 60&10

Flour sifters { Victor..... $2 00; Hunter..... $2 25; Comet..... $1 25

Slates.

School, by case..... dis 50&5@50&10

Spoke Shaves.

Iron.....dis 30
Wood .....dis 30

Spoke Trimmers.

Bonney's.....₱ dos $10.00 dis 50
Stearns'.....₱ dos $9.00 dis 20&10

Spoons.

Basting Spoons ..... dis 70&10
Britannia. .....dis 50
Rogers Bros. .....dis 50&10

Squares.

Steel and iron ..... } dis 70@10&75
Nickel plated..... }
Disston's try square and T bevels ..... dis 45
Winterbottom's try and miter.....dis 30&10

Steelyards.

dis 40&10@50

Stocks and Dies.

Blacksmith's .....dis 35
"Lightining" screw plate .....dis 1(

Stone.

Hindostan, No. 1, 6c; Axe, 4½c; Slips 9c
Washita Stone .....No. 1, ₱ lb 20
Turkey Oil Stone.....4 to 8 in.....₱ lb 40c
Turkey Slips.....$1.00@1.50
Washita Slips No 1.....₱ lb 37@38
Washita No 2 stone.....₱ lb 15c
Arkansas Stone 2.00

Stove Boards.

Zinc.....70
Oxidized.....45

Shovels and Spades.

Ames' list Nov 1 1885..... discount 2(
Dennis.....5.50
Hussey & Binns, rail road 8.00

Stove Polish.

Joseph Dixon's.....₱ gross $6 00 dis 10
Gem .....₱ gross 4 50 dis 10
Gold medal.....₱ gross 6 00 dis 25
Rising Sun.....₱ gross $5 50 net
Dixon's plumbago ..... ₱ lb 8c. net

Trowels.

Lothrops' Brick and Plastering.....dis 25
Reed's Brick and Plastering..... dis 25
Disston's Brick and Plastering... dis2(
Brade's brick..... dis 20

Tacks, Brads, &c.

New List, September 1, 1882. & Supplement Jan. 1, 1886.
American iron carpet tacks all kinds dis. 72½&10
Steel carpet tacks all kinds.....72½@10
Swedes Iron carpet tacks all kinds ..... 72½&10
Swedes iron tacks.....67½&10
Swedes iron Upholsterers' tacks.....67½&10
Tinned Swedes iron tacks.....67½&10
inned Swedes iron Upholsterers' tacks ....67½&10
American iron cut tacks .....70&10
Copper tacks .....33½&10
Copper finishing and trunk nails.....33½&10
Cigar box nails .....45&10
Finishing nails. .....60&10
Hungarian nails and miners' tacks.....60&10
Gimp and lace tacks.....67½&10
" " " tinned.....67½&10
Trunk and clout nails.....60&10
Tinned trunk and clout nails.....60&10
Basket nails.....60&10
Chair nails .....60&10
Common and patent brads.....60&10
Tinned capped trunk nails.....60&10

Tinware.

Stamped, Japaned & Pieced. list Jan 20, 1887..... .....dis 70&10

Tobacco Cutters.

Enterprise Mfg. Co (Champion).....dis 20&10@30

Traps.

Game, Newhouse.....dis 35
Victor.....60&10
Wood, mouse.....15c ₱ dos holes
Delusion, mouse.....₱ gross $18 00 dis 15

Transom Lifters.

Wollensak's Patent..... dis 50

Twine.

	BC.	P.
No. 12, Flax Twine, ¼ and ⅛ lb Balls....	21½c	27c ....
No. 18, " " ¼ and ⅛ "	21½c	27c ....
No. 36, " " ¼ and ⅛ "	20c	25c.....

2-Ply Hemp, ¼ and ⅛ lb Balls (Spring Twine) 17
3-Ply " 1 lb Balls.....17½c
3-Ply " 1¼ lb Balls 16c
Cotton Wrapping, 5 Balls to lb..... .....15@16c

Vises.

Solid box.....50&10&5@60
Parker's.....discount 20@25
Prentiss..... " 20 &5@25
Stephen's..... " 25
Saw Filers, Wentworth's .....dis20&10
Saw filers, Stearn's .....33⅓&10

Washer Cutters.

Smith's Patent .....₱ doz $12 00, dis 20&10&10
Johnson's.....₱ doz $11 00, dis 33⅓
Penny's.....₱ doz Pol. $14 00; Jap'd. $16 00, dis 55
Appleton's.....₱ doz $16 00, dis 60&10
Bonney's.....dis 30&10

Well Wheels.

8 in., $2.00; 10 in., $2.50; 12 in., $3.25

Wire. New List Jan. 18, 1884

Brass and Copper..... discount 20
Bright and annealed, Nos. 0 @18 ... dis70&5@72½
" " Nos. 19 @ 26.....dis 72½@75
" " Nos. 27 @ 36 dis 75@75&10
Coppered Nos. 0 to 18, market list.....dis 65&10@70
Galvanized Nos. 0 to 18 " " dis 60&7½@65
Tinned market Nos. 0 to 18,..... dis 65
Cast steel .....dis 50
Tinned Broom Wire.....dis70@72½
Annealed Fence, Nos. 8 and 9..... dis75
Annealed Grape, Nos. 10 to 14..... dis 75
Stubs Steel Wire regular.....$6 00.@lb dis30

Wrenches.

Coe's genuine, cash in 10 days..... 55 & 3
Girard Standard.....discount 70&10
Agricultural.....discount 75&10
Mechanics' .....dis 55&10 & 3
Bemas & Call's Combination.....25&10
Donohue's Engeneers'.....25

TINNERS' STOCK.

Tin.

Banca ..... } Market excited
Straits ..... } and advancing.
English ..... } Quotations only
Bar..... } on application.

Spelter.

American, cash, ₱ lb.....

Charcoal Tin Plate.

IC 12x12 225 sheets..... $6 00@6 80
IX 14x20 112 sheets..... 7 25@8 00
IC 10x14 225 sheets.....₱ box 5 75@6 25
IC 20x28 112 sheets.....12 25@14 00
IX 10x14 225 sheets ..... 7 25@8 00
IX 12x12 225 sheets ..... 7 75@8 25
For each additional X add $1.90@3.00

Coke Tin Plate.

	Best	Ordinary
IC 10x14 } IC 14x20 }	$5 60	

Solder.

Half and Half, in bars warranted } Quotations only
No. 1. Refined..... } only
Bingham..... } application.

Zinc.

in c. cask.....6¼
in c. open.....6¾

LEAD.

Pig.....5
Bar. ₱ lb.....
Pipe. ₱ lb.....6
Sheet. ₱ lb.....5½c. net
Chilled Shot ₱ bag 25 lbs .....6 net 1 35

BABBIT METAL.

No. 4.....6
Aliens.....9¼
Excelsior.....15
W. B. Genuine.....25

COPPER.

Lake Ingot.....17
Arizona.....15¾

IRON AND STEEL.

Flat Bar

1¼ to 4 by ⅜ to 1 inch.....1 85
4½ to 6 by ⅜ to 1 inch.....1 85
1¼ to 6 by 1¼ to 2 inch.....1 95
1¼ &1¾ by ⅝ to ¾.....2 25
1 &1¼ by ⅝ to ¾.....1 95
⅝, ¾ and ⅞ by ⅝ to ¾.....1 95

Round and Square.

1 to 1¼ inch.....1 85
2 to 2½ 1 85
2¾ to 3¼ inches.....2 05
3⅜ to 4 .....2 35
4¼ to 4½ 2 85
4¾ to 5 .....3 35

Oval.

⅜ to 1¼ inch.....2 25
⅝ to ¾ 2 25
⅞ 2 45
1 .....2 65
1⅛ 3 05

Half Oval and Half Round.

1¼ to 3 inch.....2 95
⅜ to 1¼ 2 55
⅝ to ¾ 2 55
⅞ 3 05
1 .....3 35
1⅛ 4 85

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch.....2 05
1 to 1½ by ¼ and 5-16 inch.....2 15
⅜ to ⅝ by ¼ and 5-16 inch.....2 35
½ to ⅝ by ¼ and 5-16 inch.....2 85

Hoops.

1¼ to 4, Nos. 13 to 15.....2 65
1¼ to 2, Nos. 16 to 18.....2 75
1¼ to 2, No. 19.....2 75
1¼ to 2, No. 20.....2 85
1¼ to 2, No. 21.....2 95
1¼ to 2, No. 22.....3 05
15-16, 1 and 1⅛, Nos. 13 to 15.....3 15
15-16, 1 and 1⅛, Nos. 16 to 18.....2 85
15-16, 1 and 1⅛, Nos. 19 and 20.....2 95
15-16, 1 and 1⅛, No. 21.....3 05
15-16, 1 and 1⅛, No. 22.....3 15
⅞, Nos. 13 to 15.....3 35
⅞, Nos. 16 to 18.....3 05
⅞, Nos. 19 and 20.....3 15
⅞, No. 21.....3 25
⅞, No. 22.....3 35
13-16, Nos. 13 to 15.....3 45
13-16, Nos. 16 to 18.....3 25
13-16, Nos. 19 and 20.....3 35
13-16, No. 21.....3 45
13-16, No. 22.....3 55
¾, Nos. 13 to 15.....3 65
¾, Nos. 16 to 18.....3 35
¾, Nos. 19 and 20.....3 45
¾, No. 21.....3 55
¾, No. 22.....3 65
11-16, Nos. 13 to 15.....3 75
11-16, Nos. 16 to 18 .....3 55
11-16, Nos. 19 and 20.....3 65
11-16, No. 21.....3 75
11-16, No. 22.....3 85
⅝, Nos. 13 to 15.....3 95
⅝, Nos. 16 to 18.....3 85
⅝, Nos. 19 and 20.....3 95
⅝, No. 21.....4 05
⅝, No 22.....4 15
⅝, No 23.....4 25

Light Band

1¼ to 6 by ⅛ to 3-16 in.....2 35
1½ to 6 by Nos 11 and 12.....2 45
1 to 1⅝ by ⅛ to 3-16 in.....2 45
1 to 1⅝ by Nos. 11 and 12.....2 55
⅝ and 13-16 by ⅛ to 3-16 in.....2 75
⅝ and 13-16 by Nos. 11 and 12.....2 85
¾ and 11-16 by ⅛ to 3-16 in.....3 05
¾ and 11-16 by Nos. 11 and 12.....3 15
⅞ and 9-16 by ⅛ to 3-16 in 3 35
⅞ and 9-16 by Nos. 11 and 12.....3 40
1 by ⅛ to 3-16 in.....3 40
1 by Nos. 11 a d 12.....3 70

Wagon Box Iron.

⅛ inch, beveled edge, by Nos. 11 and 12.....2 85
⅛ inch, " " " 13 and 14.....3 15
¾ inch, " " " 11 and 12 .....3 15
¾ inch, " " " 13 and 14.....3 35

Sheet Iron.

No. 13 to 4. .....2 55
No. 15 to 17.....2 75
No. 18 to 21.....2 95
No. 22 to 24.....2 95
No. 25 to 26.....3 05
No. 27.....3 15
No. 28 .....3 35

Iron Boiler Plates.

Tank, ¼ inch and heavier.....2 45
C No. 1, " 2 70
C H No. 1, " 2 95
C H Flange, " 3 65
Extra Flange, " 4 05
Solid Fire Box, " 4 95

Steel Boiler Plates—1-4 in. and heavier.

Crank $2 55
Shell $3 05
Flange.....$3 30
Marine Flange.....$3 80
Fire Box.....$4 45

Above includes plates 90 inches wide.
90 to 96 in. wide..... ½c. ₱ lb extra.
96 to 100 in. wide.....1 c. "
100 to 104 in. wide.....1½c. "
104 to 116 in. wide.....special.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ₱ lb
to 2 in. inclusive	.09
9-16 to ½ in	.09
7-16 to ⅝ and 2½ to 3 in	10½
3⅛ to 4 in	.10
⅜ to 11-16 an	4½ 11½

TRAVELER'S RECISTER.

Standard Time.
Revised March 6th, 1888.

N. Y. C. & St. L. R. R.Co.—"The Nickel Plate."

EASTWARD.	ARRIVE.	DEPART.
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 40 p m	5 45 a m
WESTWARD.	ARRIVE.	DEPART.
Chicago Passenger	.....	6 30 a m
Fostoria Passenger	4 46 p m	4 51 p m
Local Freight	5 20 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.

Euclid Accommodation departs 6:24 a. m. 12:10 a. m., 5:05 p. m.

All trains daily, except Sunday.

Cleveland & Pittsburg.

	ARRIVE.	DEPART.
New York Express	12 45 p m	7 45 a m
New York Express	6 55 p m	1 40 p m
Alliance & Akron Accom.	9 35 a m	3 25 p m
Ravenna Accommodation	8 20 a m	5 00 p m
Night Express	* 5 25 a m	*11 10 p m

*Daily; all other trains daily except Sunday.

Mt. Vernon & Pan Handle Route

C., A. & C. Ry. Co.	ARRIVE.	DEPART.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Co'. & Cin. Night Express	7 30 a m	8 00 p m
Akron & Columbus Exp	12 45 p m	1 40 p m
Akron & Orrville Accom	9 35 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily except Sunday.

Erie Railway.
Depot, South Water St. and Viaduct.

	ARRIVE.	DEPART.
N. Y. & Pitts. Express	15 58 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommodation	.....	†6 40 a m
Pittsburgh Express	† 6 25 p m	.....
Youngstown Local	†8 05 a m	.....
Mahoning div. and Pitts Local	.....	*11 40 a m
Mahoning Val Accom	.....	*4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	.....

* Daily, † Daily except Sunday. ‡ Daily except Monday.

Lake Shore & Michigan Southern Railroad.

TRAINS GOING EAST.	Arrive from West.	Depart East.
No. 4, Fast Limited Ex	2 55 a m	*2 55 a m
No. 6, N. Y. & Bos. Ex	*1 35 a m	*1 40 a m
No. 8, N. Y. B't'p & At Ex	*8 25 a m	*8 50 a m
No. 26, Elyria Accom	†7 45 a m	.....
No. 10, Toledo & Sandusky Accommodation	†11 05 a m	.....
No. 24, Buffalo Accom	.....	†7 00 a m
No. 10, N. Y. & Boston "Flyer,"	.....	*11 50 a m
No. 12, N. Y. & Bos. Ex.	*2 35 p m	*3 00 p m
No. 2, Night Express	†9 40 p m	†10 00 p m
No 25, Conneaut Accom	.....	†4 25 p m
TRAINS GOING WEST.	Arrive from East.	Depart West.
No. 1, Fast Limited Ex	*12 15 a m	*12 15 a m
No. 23, Cleveland Express	*2 15 a m	.....
No. 3, Chi. Ex. via Sand'y	15 30 a m	†5 45 a m
No. 25, Mich. Ac. via Norw'k	.....	†5 45 a m
No. 21, Toledo Ex. via Norwalk and Sandusky	†12 50 p m	†3 20 p m
No. 5, Fast St. Louis & Chicago Ex. via Sandusky	*10 50 a m	*10 55 a m
No. 9, Chi. Pac. Ex. via Nor'k	*6 55 p m	*7 15 p m
No. 31, Elyria Accommodation, to Elyria only	.....	†4 30 p m
No. 27, Conneaut Accom	†8 10 a m	.....

Sunday train for Nottingham—Depart 8:15 a. m. and 1:00 p. m.; arrive 9:20 a. m. and 4:45 p m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

A local Cleveland and New York Sleeper and dining car daily on No. 10, leaving Cleveland at 11:50 a. m., arrives Grand Central Depot, New York 7:30 a. m.

For further information as to trains, connections and sleeping car berths apply at the City Ticket Office 229 Bank St., Mercantile Bank building. Telephone 669.

M. E. GAUL, City Pass. Ag't. A. J. SMITH, Gen'l Pass. & Ticket Ag't.

Cleveland and Canton Railroad.

Arrive.—Canton, Shelrodsville and Coshocton 9 55 a.m., 7 00 p.m.
Kent —*7 50 a.m. , *7 16 p.m.
Bedford—*7:50 a.m., 1:05 p.m., 7 16 p.m.
Newburgh and Miles avenue—7:10 a.m., 4:15, p.m. 5:33 p.m.
Depart—
Canton, Sher'dsville & Cosh't'n—7:00 a.m. and 3:10 p.m.
Kent—*8:38 a.m. and *8:36 p.m.
Bedford—*8:38 a.m., 4:45 p.m., 11:10 a.m., 5:45 p.m.
Newburgh and Miles Avenue—6:12 a.m., 2:00 p.m., 4:40 p.m.

Trains marked with * run daily. All others daily except Sunday.

Depot at Ontario street, one block north of Huron street

Cleveland, Lorain and Wheeling.

	DEPART.	ARRIVE.
Wheeling Express	6 45 p m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

Pittsburgh & Lake Erie Railroad.

On and after Jan. 2, 1888, passenger trains will depart from and arrive at the Pittsburgh and Lake Erie Depot at Pittsburgh, as follows, Central time:

P. & L. E. R.R. Depart for—

No. 1, Cleveland, Bradford and East
No. 5, Buffalo, St. Louis, Cleveland
No. 5, Beaver Falls Accommodation
No. 7, Buffalo, New York, and all New England points
No. 9, Chicago, Cincinnati, St. Louis
No. 11, Buffalo Express
No. 13, Beaver Falls Accommodation
No. 15, Buffalo Express

Arrive from—

No. 2 Beaver Falls Accommodation
No. 4, Buffalo and Cleveland Night Exp.
No. 6, Youngstown Accommodation
No 8 Beaver Falls Accommodation
No. 10, Chicago, Cincinnati & St. Louis
No. 12, Buffalo Express
No. 14, Cincin., St. Louis and Cleveland
No. 14, Cleveland & Buffalo Express

5 25 a.m	6 45 a.m	8 40 a.m	10 15 a.m	1 10 p.m	3 30 p.m
10 30 p.m	5 25 a.m	6 55 a.m	9 20 a.m	12 40 p.m	1 35 p.m
5 45 p.m	8 05 p.m	10 35 p.m			

Pittsburgh & Lake Erie trains Nos. 4, 15, 8 and 10 daily.

E. HOLBROOK, General Superintendent.
R. W. JONES, Master of Transportation.
A. D. SMITH, Gen'l Pass, Ag't, Pittsburgh.

WHEELING & LAKE ERIE

TIME TABLE—IN EFFECT JAN. 8, 1888.
Central Standard Time.

EASTWARD.	No. 5.	No. 7.	No. 9.*	No. 13*
Toledo....lv	7 45 AM	1 10 PM	4 50 PM	7 45 PM
Oak Harbor...ar	8 41	2 05	5 45	10 01
Fremont	9 06	2 30	6 10	10 45
Clyde	9 22	2 47	6 25	11 15
Bellevue	9 37	3 03	6 40	11 40 PM
Monroeville...lv	9 55	3 20	6 8	3 10 AM
Norwalk	10 10	3 40	7 15	3 22
Wellington	11 00	4 32	8 08	4 06
Creston	11 53	5 20	9 05 PM	4 47
Orrville....ar	12 20 PM	5 48	9 40 PM	5 15*
Orrville....lv	12 40	5 53	7 05 AM	7 05
Massillon....ar	1 20	6 35	7 52	7 52
Massillon....lv	1 20	6 35	7 52	7 52
Navarre	1 35	6 50	8 10	8 10
Valley Junc.lv.	2 20	7 35	8 55	8 55
New Cumberl'd	2 23	7 48	9 10	9 10
Sherrodsville	2 45	8 00	9 25	9 25
Leesville	2 52	8 08	9 40	9 40
Bowerston....ar	2 58 PM	8 15 PM	9 50 AM	9 50 AM
Canal Dover	2 57 PM			
New Comerst'n	3 38			
Cambridge	4 35			
Macksburg	6 02			
Marietta....ar	7 15 PM			

WESTWARD.	No. 6.	No. 8.	No. 4.	No. 2.*
Marietta....lv	6 45 AM	2 20 PM		
Macksburg	7 55	1 30		
Cambridge	9 25	3 00		
New Comerst'n	10 23	3 58		
Canal Dover	11 04 AM	4 38 PM		
Bowerston	11 25 AM	3 45 PM	5 55 AM	
Leesville	11 32	3 55	6 02	
Sherrodsville	11 40	4 10	6 10	
New Cumberl'd	11 52	4 25	6 22	
Valley June	12 20 PM	5 02	6 45	
Navarre	12 50	5 35	7 35	
Massillon	1 05	5 50	8 00	
Orrville....ar	1 40	6 25	8 55	
Orrville....lv	1 45	6 35*	9 13	
Creston....lv	2 18	7 02	9 43	
Wellington	3 05	7 43	10 33	
Norwalk	3 55	8 25	11 30	7 25 AM
Monroeville	4 07	8 35	11 45	7 35
Bellevue	4 23	9 45	11 59	7 51
Clyde	4 39	10 00	12 15 PM	8 06
Fremont	4 55	10 17	12 30	8 23
Oak Harbor	5 20		12 53	8 45
Toledo....ar	6 20 PM	11 15*	1 50 PM	9 40 AM

No. 27	No. 25	Huron Divis'n.	No. 26	No. 28
4 50 PM	7 40 AM	Ar. Huron Lv	8 55 AM	5 30 PM
4 32	7 22	Friese Landing	9 10	5 45
4 20	7 10	Milan	9 28	6 03
Lv 3 55	Lv 6 45	Norwalk	Ar 9 55	Ar 6 30
Ar PM	Ar AM		Lv AM	Lv AM
		Monroeville		

* Daily.

Train No. 13 leaves Toledo *7 45 p. m.; arrive Monroeville 12 15 a. m. and Norwalk 12 35 a. m

This road is now open through from Toledo to Bowerston, connecting with the Pennsylvania System for all points East.

THROUGH CAR SERVICE.

Between Toledo, Cambridge and Marietta.
" " and Bowerston.
" " and Akron, Youngstown and Pittsburgh.
" Chicago, Akron, Youngstown and Pittsburgh.

M. D. WOODFORD, Gen'l Manager. JAMES M. HALL, Gen'l Pass. Agt.

Scioto Valley Railway

TIME TABLE.
In effect May 27, 1888.

THE SHORT LINE TO ALL POINTS

North and South, East and Southeast, West and Northwest.

TRAINS GOING SOUTH.

STATIONS.	No. 2.	No. 4.	No. 6.
Columbus....Lv	7 10 a.m	11 25 a.m	5 25 p.m
Valley Crossing	7 30 "	11 44 "	5 45 "
Lockbourne	7 41 "	11 53 "	5 56 "
Ashville	7 55 "	12 07 p.m	6 10 "
Circleville	8 15 "	12 26 "	6 30 "
Kingston	8 34 "	12 44 "	6 49 "
Chillicothe	9 01 "	1 30 "	7 35 "
Sharon	9 36 "	2 05 "	8 10 "
Waverly	9 46 "	2 14 "	8 20 "
Piketon	9 58 "	2 27 "	8 33 "
Big Run	10 12 "	2 41 "	8 47 "
Lucasville	10 27 "	2 57 "	9 03 "
Portsmouth	10 50 "	3 20 "	9 25 "
Sciotoville	11 05 "	3 35 "	9 40 "
Wheelersburg	11 10 "	3 40 "	9 45 "
Havernill	11 29 "	3 59 "	10 04 "
Hanging Rock	11 40 "	4 10 "	10 15 "
Ironton	11 50 "	4 20 "	10 25 "
Petersburg	12 00 m.	4 30 "	10 35 "
Ashland....Ar	12 30 p.m	5 00 p.m	11 05 p.m

Trains Nos. 2 and 4 daily, except Sunday.
Train No. 6 daily.
Train No. 6 takes supper at Chillicothe.

TRAINS GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.
Ashland....Lv	2 46 a.m	9 05 a.m	5 35 p.m
Petersburg	3 15 "	9 35 "	6 05 "
Ironton	3 26 "	9 46 "	6 15 "
Hanging Rock	3 36 "	9 56 "	6 25 "
Havernill	3 46 "	10 07 "	6 36 "
Wheelersburg	4 06 "	10 28 "	6 55 "
Sciotoville	4 12 "	10 33 "	7 00 "
Portsmouth	4 27 "	10 05 "	7 15 "
Lucasville	4 49 "	11 14 "	7 37 "
Big Run	5 04 "	11 32 "	7 53 "
Piketon	5 18 "	11 48 "	8 07 "
Waverly	5 30 "	12 01 p.m	8 20 "
Sharon	5 40 "	12 11 "	8 30 "
Chillicothe	6 35 "	1 10 "	9 06 "
Kingston	7 01 "	1 26 "	9 31 "
Circleville	7 20 "	1 36 "	9 49 "
Ashville	7 40 "	1 55 "	10 08 "
Lockbourne	7 55 "	2 15 "	10 22 "
Valley Crossing	8 08 "	2 39 "	10 31 "
Columbus....Ar	8 20 a.m	3 00 p.m	10 50 p.m

Train No. 1 daily.
Trains Nos. 3 and 5 daily, except Sunday.

COUPON TICKETS, by the best routes and to all principal points in the United States and Canada, can be found at the following Stations: Columbus, Circleville, Kingston, Chillicothe Waverly, Portsmouth, Ironton, A. C. & I. Ashland.

For further information relative to rates, connections and through time, call on your Ticket Agent, or address J. ROBINSON, Receiver.
JNO. J. ARCHER, Gen'l Pass. & Ticket Ag't, Columbus, Ohio.

Ft. Wayne, Cincinnati & Louisville

RAILROAD.

THE POPULAR ROUTE

BETWEEN THE

NORTH and SOUTH

THE DIRECT ROUTE TO OR FROM
FORT WAYNE,
INDIANAPOLIS,
TERRE HAUTE,
EVANSVILLE,
AND ST. LOUIS.

13 MILES SHORTER 13
—BETWEEN—
Fort Wayne and Indianapolis
Than any other Route.

22 MILES SHORTER AND QUICKER 22
By 3 HOURS, Between
Louisville and Fort Wayne.

Ask for Tickets
—VIA—
Ft. Wayne, Cincinnati & Louisville Railroad.

For sale by all Agents of connecting lines.
EAST, WEST, NORTH AND SOUTH.

W. W. WORTHINGTON, Gen'l Supt. S. A. WIKEL, Gen'l Ticket Agent, FORT WAYNE, IND.

The Picturesque Lehigh Valley Route.

Two through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelphia, leaving Suspension Bridge 8:35 A. M. and 3:40 P. M., Buffalo 9:15 A. M. and 5:15 P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthracite Coal is used entirely, guaranteeing the passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal.

E. B. BYINGTON, Gen'l Pass. Agent Bethlehem, Pa.

Expiration Registers.

MANUFACTURERS' and Dealers' Insurance Registers with special ruling for number of Policy, Company, seven spaces for amounts on different property, amount of policy, amount of premiums, time of expiration, etc., will be sent post-paid on receipt of $1.00. Or we will give one as a premium with each new subscription to the IRON TRADE REVIEW, price $3.00 per year.

Address,

Cleveland Printing and Publishing Co.

Cleveland, Ohio.

Detroit & Cleveland

STEAM NAVIGATION CO.

Week Days **FOR DETROIT** 9.00 P. M.

Special Sunday Night and Thursday Morning Trips, July and August.

Four Trips **For Mackinac** per Week,

and Lake Huron Way ports.

All Departures from 23 River Street.

E. B. WHITCOMB, G. P. A. T. F. NEWMAN, G. A

VALLEY RAILWAY.

Depot foot South Water Street

	Arrive.	Depart.
Valley Junction Mail	*7 30 a m	*7 20 p m
Marietta Express	†11 00 a m	†2 50 p m
Canal Dover Express	* 4 30 p m	*10 00 a m
Akron & Cleve. Accom	* 7 45 p m	*7 45 a m

*Daily.
†Daily, except Sunday.

WM. THORNBURGH, Gen. Manager. R. A. CARRAN, Gen. Pass. Ag't.

THE FAVORITE

ERIE RAILWAY

AND

Picturesque Route

TO

New York, Boston and the East.

THE SHORTEST AND QUICKEST ROUTE TO PITTSBURGH, WASHINGTON AND BALTIMORE, AND THE SOUTHEAST.

Change of time goes into effect May 20, 1888.

Central, or Ninetieth Meridian time, 33 minutes slower than Cleveland city time.

Until further notice trains will leave from the New Central Depot, South Water Street and Viaduct, as follows:

	Depart.
No. 62, Mahoning Valley Accommo	† 6 40 a m
No. 72, New York Express,	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast New York Express	* 3 00 p m
No. 64, Pittsburgh Express,	* 3 00 p m
No. 66, Youngstown Accommo	* 5 00 p m
No. 68, Pittsburgh Express	†11 10 p m
No. 68, New York Express	†11 10 p m
No. 70, Pittsburgh Local Express	*11 40 a m
No. 74, Shenango Valley Express	† 4 00 p m
	Arrive.
No. 73, Shenango Valley Express	† 9 23 a m
No. 61, New York Express	† 5 45 a m
No. 61, Pittsburgh Express	† 5 45 a m
No. 65, Fast New York Express	*10 55 a m
No. 65, Pittsburgh Express,	*10 55 a m
No. 67, Pittsburgh Express	† 1 20 p m
No. 63, New York Express	* 7 05 p m
No. 69, Pittsburgh Express	* 8 40 p m
No. 77, Youngstown Local	* 7 25 a m
No. 13, Erie Express, carrying express matter only, from all points East and South-east, carries no passengers (except Monday)	† 1 20 p m.

* Daily .† Daily, except Sunday.

This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City and intermediate points without change. No change to Boston and New England cities.

Baggage checked through to all points East.

Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Central Depot, South Water street and Viaduct, Cleveland. **Ship by Erie Express.**

E. B. THOMAS, 2d Vice President, Cleveland, O.
L. P. FARMER, Gen'l Pass. Agent, New York.
W. C. RINEARSON, Ass't G. P. A., Cincinnati, O
M. L. FOUTS, City Passenger Agent, 141 Superior Street, Weddell House, Cleveland, O.

Cleveland & Marietta R. R.

THROUGH LINE BETWEEN

Marietta, Caldwell, Cambridge, Newcomerstown, Canal Dover, Canton, Akron, Cleveland, Buffalo, Toledo Pittsburgh, New York, Coshocton, Newark, Zanesville, Columbus, Chicago and St. Louis.

In effect April 22d, 1888.

GOING NORTH.			GOING SOUTH.
No. 4.	No. 2.	STATIONS.	No. 1.
9 55 AM	2 00 AM	Parkersburg	2 45 PM
12 20 PM	6 45	Marietta	10 15 AM
12 40	7 05	Caywood	9 55
12 46	7 11	Stanley	9 49
1 00	7 25	Whipple	9 35
1 10	7 35	Warner	9 25
1 23	7 48	Elba	9 12
1 30	7 55	Macksburg	9 05
1 37	8 01	Dexter City	8 58
1 41	8 05	South Olive	8 54
1 48	8 12	Dudley	8 47
1 57	8 20	Caldwell	8 40
2 07	8 30	Belle Valley	8 30
2 17	8 40	Ava	8 19
2 29	8 52	Pt. Pleasant	8 07
2 42	9 04	Byesville	7 53
3 00	9 25	Cambridge	7 36
3 07	9 32	Oldham's	7 27
3 14	9 40	Miller's	7 20
3 24	9 50	Kimbolton	7 10
3 39	10 05	Guernsey	6 56
3 47	10 12	Post Boy	6 49
3 58	10 23	N. Comerstown	6 40
4 05	10 30	Wolf's	6 31
4 17	10 43	Phillipsburg	6 20
4 22	10 48	Black Band	6 14
4 28	10 54	Turner's	6 09
4 38	11 04	Canal Dover	6 00 AM
5 00	11 27	ar. Vall'y J'n. lv	
5 02	11 35	lv. Vall'y J'n. ar	
	12 19 PM	Canton	
	1 12	Akron	
	2 36	Cleveland	
	8 00	Buffalo	
11 15 PM	6 20	Toledo	

Train No. 8 leaves Marietta at 1 40 p. m. Whipple 2 40, Warner 3 00, Elba 3 20, Macksburg 3 35, Dexter City 3 47, Caldwell 4 25, arriving Cambridge 6 30 p. m. Train No. 5 leaves Valley Junction at 5 13 p. m., arriving at Canal Dover 5 35 p. m.

Through coaches on trains Nos. 2 and 3 between Marietta, Canton, Akron, Cleveland and Toledo. Close connections made at Marietta with C., W. & B., M., C. & N., Z. & O., and Ohio River Packets; at Cambridge with B. & O., east and west; at Newcomerstown with P., C. & St. L. east and West; at Canal Dover with C., L. & W and C. & P., north and east; at Valley Junction with W. & L. E. and Valley R'y.

W. K. RICHARDS, Gen. Pass. Agt

A. T. WICKOFF, Gen. Manager.

¼ to 6 in.	11½
¼ to 9-32 and 6½ to 7 in	12
3-8 in	14

Flats.

	cts. lb
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	cts. lb.
Machinery base price.	02¾
Tire "	02¾
Spring "	03¼
Sleigh Shoe "	02¾
Toe Calk	03
Cutter Shoes, tapered and burr	03

For extra sizes, see classification below.

Machinery Steel.

ROUNDS AND SQUARES.

	cts. per lb ex.
1 to 3 in. incl.	base
3¼ to 4 "	0.3
4½ to 6 "	1.0
⅝ to 15-16 "	0.2
¼ to 11-16 "	0.3
⅝ to 7-16 "	0.4
5-16 to 11-32 "	0.5
¼ and 9-32 "	0.7

Machine cutting, specified lengths, ab'e 24 in...0.2
Machine cutting, specified lengths, 12 to 24 in....0.4

Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6 cents on each size extra. Sawing, one-half of the above extra for cutting.

FLATS. cts. per lb ex.

1¼ to 6 in., by 5-16 to 1 in. thick	base
1¼ to 6 in., by ¼ and 9-32 in. thick	0.2
1¼ to 6 in., by 3-16 and 7-32 in. thick	0.3
1¼ to 6 in., by ⅛ and 5-32 in. thick	0.4
⅜ to 1 7-19 in., by ¼ to 1 in. thick	0.3
⅜ to 1 7-16 in., by 3-16 and 7-32 in. thick	0.4
⅜ to 1 7-16 in., by ⅛ and 5-32 in. thick	0.5
⅜ to 11-16 in., by ¼ to ⅛ in. thick	0.4
⅜ to 11-16 in., by 3-16 and 7-32 in. thick	0.6
⅜ to 11-16 in., by ⅛ and 5-32 in. thick	0.8
⅜ to ¾ in., by 1-16 and 3-22 in. thick	2.0
13-16 to 1½ in., by 1.16 and 3-32 in. thick	1.5
1¼ to 3 in., by 1-16 and 3-32 in. thick	1.0

These extras apply on Tire, Toe-Calk, Shoe and Flat Machinery Steel, also on Cutter Shoes.

SPRING STEEL FLATS. cts. ex.

1¼ to 4 in. by No. 4 gauge to ⅛ in. inclusive,	base
1 and 1⅛ in. by No. 1 gauge to 4 gauge "	0.2
1 to 3 in. by No. 5 gauge to 7 gauge "	0.5
⅛ to 3 in. by No. 8 gauge to 10 gauge "	1.0
⅜ to 3 in. by No. 11 gauge to 16 gauge "	2.0
⅜ to 3 in. by No. 17 gauge to 20 gauge "	3.5
⅜ to ⅝ in. by No. 10 gauge to 16 gauge "	4.0
⅜ to ⅝ in. by No. 17 gauge to 20 gauge "	5.0
⅜ to ⅝ in. by No. 21 gauge to 24 gauge "	6.0

Bessemer and Open Hearth cut to length. 24 nch and over 1-10 cent per lb. extra, and under, y special contract.

ROUND SPRING STEEL. cts. ex

⅛ to 1⅛ inches	base
¼ to 9-16 inches	0.2
⅜ to 7-16 inches	0.5
5-16 inches	1.0
¼ inches	1-5

English Tool Steel.

Jessops	16c
Hob'on's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

¼, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ¼, ⅝, 11-16 and ¾ inch diam	4 00

Rolls and Castings.

Furnace floor and straightening plates	1¼c
Housings and castings not otherwise specified	1¾c
Guide plates	2½c
Spindles and coupling boxes	1¾c
Sand rolls and pinions, large size	2 c
Sand rolls and pinions, small size	2¼c
Pipe mill castings	3 c
Rolling mill castings under 50lb	2 c
Spur and bevel wheels, large	3 c
Spur and bevel wheels, small	3¼c
Pulleys up to 30 inches	4 c
Pulleys over 30 inches	3½c
Engine castings, light	3¼c
Engine castings, heavy	2¾c

SCRAP IRON AND OLD METAL

	Net Ton.
No. 1 R. R. wrought scrap	$23 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	15 00
Stove plate (free from burnt iron)	10 50
Grate bars	11 00
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	28 00
Light sheet iron	10 00
Axle turnings	16 00
Wrought turning (free from cast)	15 00
Wrought iron, oily drillings	14 00
Cast borings	11 00
Malleable iron	10 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails	gross tons $27 00
Old steel rails	23 00
Car wheels	20 00
Old copper	per lb 7
No. 1. H. red Brass	8¼
Heavy yellow brass	6¾
Light yellow Brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

WROUGHT IRON PIPE.

DISCOUNTS.

	Discount Per Ct.
Wrought iron pipe: Butt black X str	
XX str	50
Wrought iron pipe: Lap black X str	
XX str	60
Wrought iron pipe: Butt galv	40
" " Lap "	50
Lap-welded boiler tubes	50
" drive pipe	
" casing	
Lead pipe per lb	
Sheet lead "	
Galvanized spiral pipe	50
" " fittings	30
Patent adjustable ells	40
Globe ventilators	60
Tin tubing	50
Fittings for same	30
Expanding conductor pipe and fittings	40
Cast iron piece fittings for wrought iron pipe, black and galv	70
Bushings and plugs	75

Malleable unions	65
" flange unions	72½
Long screws	70
Gas pipe hooks	50
Cast iron flanges, manifolds and expansion pipe hangers	65
Hook, ring and expansion plates, coil stands	67½
Iron body: Globe, angle, check, cross, safety, butterfly, throttle, back pressure and foot valves	65&10
Iron body: Expansion joints and iron cocks, all iron	65&10
Iron body: Iron cocks with brass plugs	60&10
Straight way valves	
Brass: Globe, angle, check, cross safety, and radiator valves	60&10
Throttle and butterfly valves	50&10
Brass: Fin. globe valves, with finished brass wheels	40&10
Brass: Steam, service, meter and union meter cocks	57½&10
Brass: Expansion joints and steam bibbs	50&10
Mississippi gauge " cocks	55
Bingham "	30
Gas proving pumps	50
Oil cups, lubricators and air cocks	60&10
Cocks for steam gauges	60&10
Cylinder cocks	50&10
Comp. gauge cocks	55&10
Water gauges, steam whistles and whistle valves	60&10
Gas fixture fittings	55
McNamara hydrants and street washers	Spec'l
Stop cock boxes	Spec'l
Galvanized wrought iron range boilers, to 52 gallons	65
Galvanized wrought iron range boilers, larger	50
Stands for same	40
Copper bath tubs	25
Closets	Spec'l
Cast iron soil pipe, to 6 in. inclusive	60
" " fittings, to 6 in. inclusive	65
Cast iron sinks	70
" slop sinks	60
Drive-well points	50
Ground key work:	
Rough and fin. plain, tray and bath bibbs } " " stops, shower stops, hydrant and ball cocks }	55&10
Compression:	
Rough and fin. plain, tray and bath bibbs	50&10
" " stops; urinal, hopper, hydrant and ball cocks	50&10
Basin cocks, from No. 1 to 13 inclusive	50&10
" " above No. 13, and double basin	40&10
Shampooing and sink cocks	40&10
Pantry cocks	50&10
Shampooing sprinklers	50&10
Double bath cocks and chain stays	50&10
Hose goods, plain and water back couplings	55&10
Boiler couplings, ground face, per set net, $1.25	10
Boiler couplings plain face, per set net, $1.20	10
Basin plugs and grates; bath, sink and wash tray plugs	60&10
Soldering nipples and unions	65&10
Union joints	60&10
End ferrules; street washer screws, checks and guides	55&10
Hydrant and basin clamps, hydrant sockets	55&10
Pipe taps, reamers and dies	60
Plain pipe tongs and gas plyers	50
Wrenches: Coe	50 & 5
" Girard agricultural	65
" " standard	60 & 5
" Stillson	33⅓
" Armstrong	25 & 5
" Bemis & Call	25 & 5
" Rouse	30
" Bauer's	10
Pipe tongs: Brown's adjustable	50
" Jarecki	50
" Robbins' chain	10
" Brock's	10
Vises: Plain pipe	55
" Smith comb	50
" Parker's comb	50
" Bauer's pipe and bolt	10
Machinists' hammers	40
Copper "	Spec'l
Pipe cutters: Stanwood	20
" Eureka	45
" Saunders	40
" Barnes	50 & 5
Malleable oilers and hand lamps	Spec'l
Screwing stocks	60
Armstrong's adjustable stocks and dies	25&10
Waste, at manufacturer's prices.	
Gas fitters' cement	Spec'l
Hair felt	Spec'l
Riley Bros. cement	Spec'l
Otley Bros. steam packing	Spec'l
Mineral wool	Spec'l
Lubricating compound	Spec'l
Malleable iron fittings, black and galv	25
Wrought iron couplings and nipples, black and galv	70

Standard Wrought Iron, Steam, Gas and Water Pipe.

Nominal Size Inside Diameter.	Price per Foot, Black.	Price per Foot, Galvanized.	Thickness.	Nominal Weight per Foot.	No. of Threads per in. of Screw.	Price, Extra Threads.
In.			In.	Lbs.		
⅛	0 04	0 05	.068	0 24	27	0 05
¼	0 04	0 05	.088	0 42	18	0 05
⅜	0 04	0 05½	.091	0 56	18	0 05
½	0 05	0 07	.109	0 84	14	0 05
¾	0 07	0 09	.113	1 12	14	0 05
1	0 09½	0 12½	.134	1 67	11½	0 06
1¼	0 12½	0 17	.140	2 24	11½	0 07
1½	0 22	0 25	.145	2 68	11½	0 08
2	0 28	0 32	.154	3 61	11½	0 10
2½	0 44	0 49	.204	5 74	8	0 15
3	0 58	0 64	.217	7 54	8	0 20
3½	0 70	0 86	.226	9 00	8	0 25
4	0 85	1 00	.237	10 66	8	0 35
4½	1 00	1 25	.246	12 49	8	0 45
5	1 20	1 50	.259	14 50	8	0 55
6	1 65	2 00	.280	18 76	8	0 70
7	2 00		.301	23 27	8	0 85
8	2 75		.322	28 18	8	1 00
9	3 70		.344	33 70	8	1 20
10	4 75		.366	40 06	8	1 25
11	5 75		.375	45 02	8	1 50
12	6 50		.375	49 00	8	2 50
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Size, Inside Diameter Nominal	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	5	5 3-16	6⅝	6¾	7⅝	8¼	8⅝	9⅝
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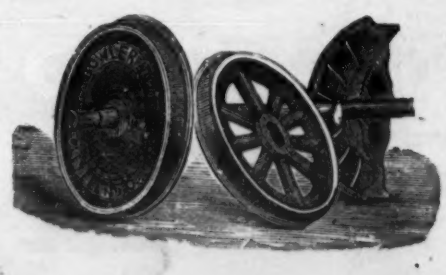

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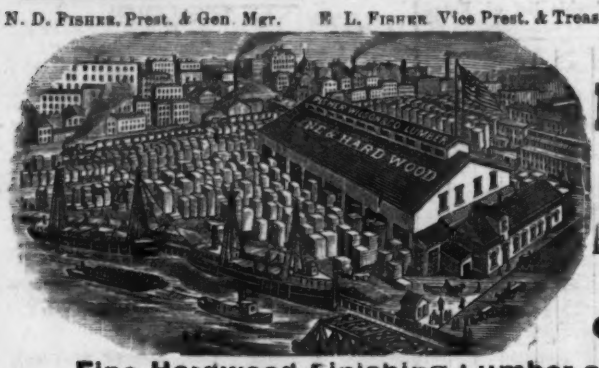

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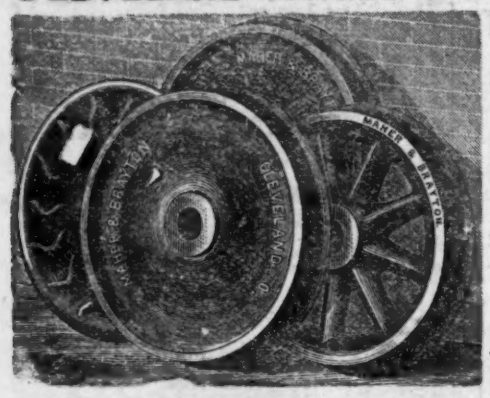

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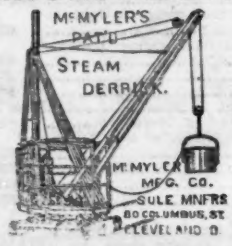

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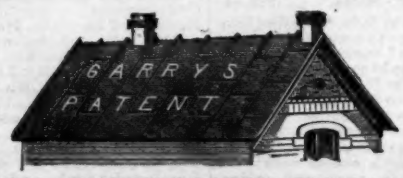

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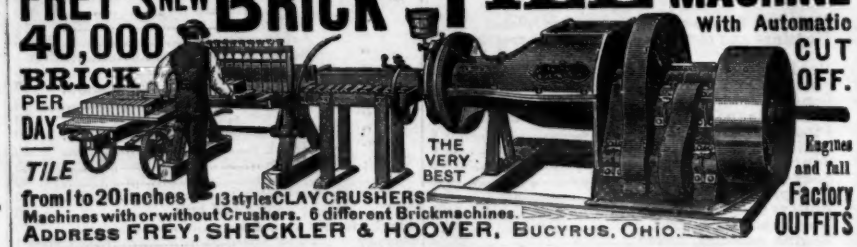

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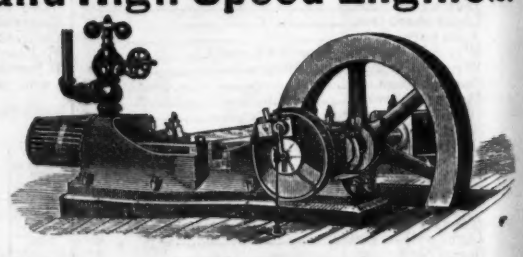

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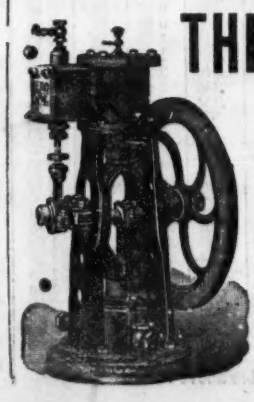

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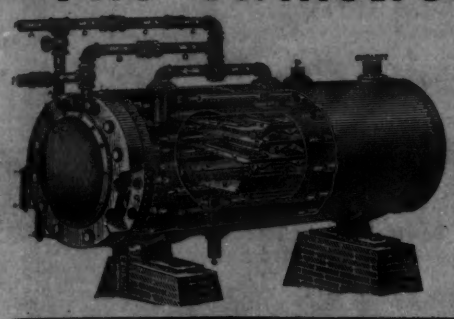

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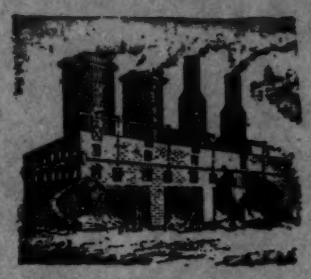

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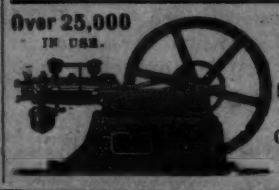

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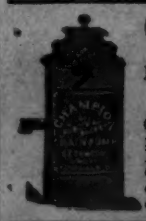

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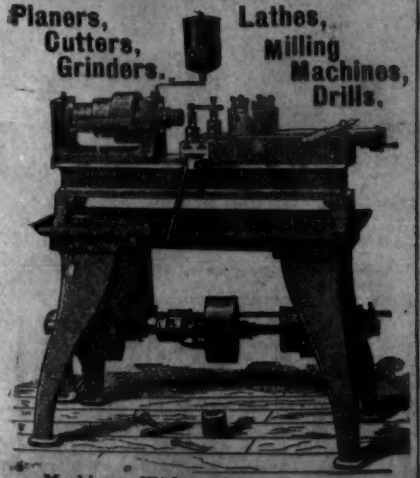

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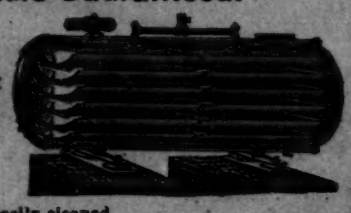

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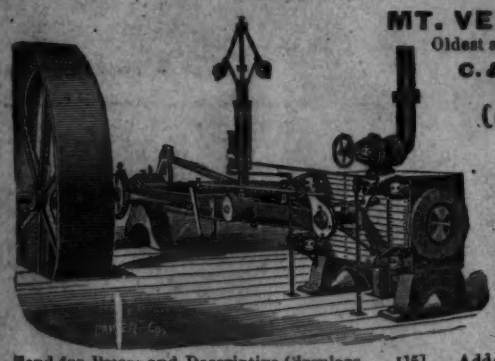

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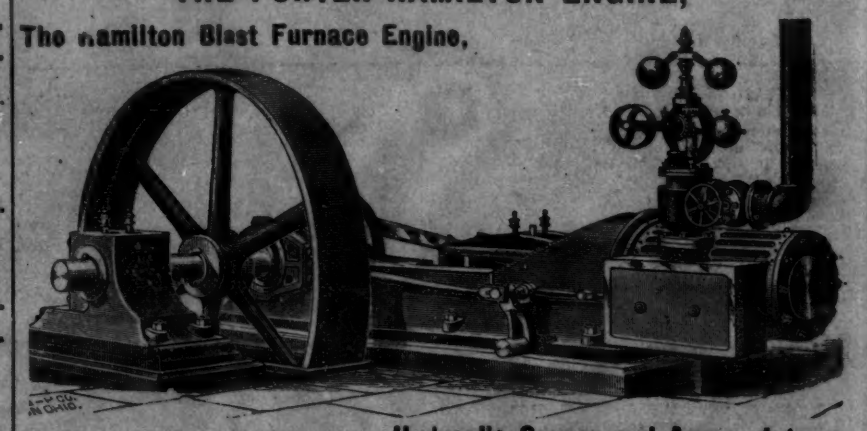

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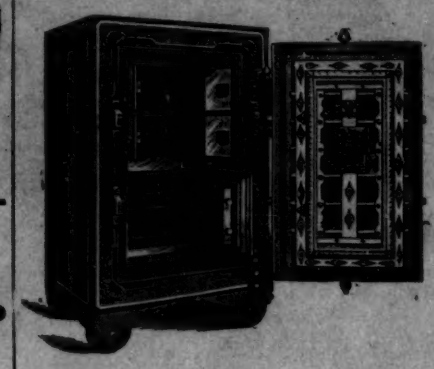

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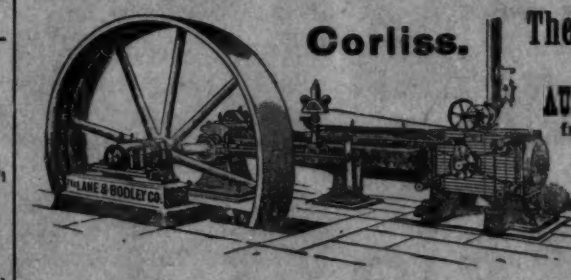

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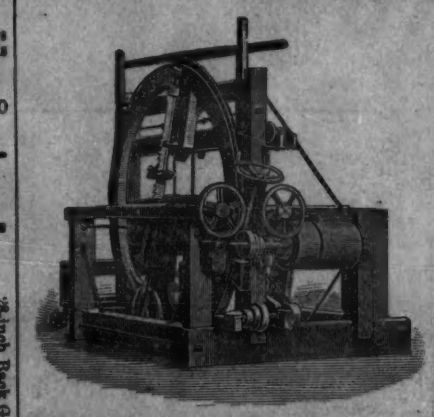

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